



IMPERIAL AGRICULTURAL
RESEARCH INSTITUTE, NEW DELHI.

THE
PROCEEDINGS
OF THE
LINNEAN SOCIETY
OF
NEW SOUTH WALES.

FOR THE YEAR

1897.

Vol. XXII.

WITH FORTY PLATES.

(Plates I.-XXXIII., XLXIII.*b*)-XXXIX.)

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CORRIGENDA.

Page 41, line 11—for *Tabernaemontana* read *Tabernaemontani*.

Page 181, line 10—for *M. fuscum* read *M. fuscum*.

Page 641, line 24—for *Urnysem* read *Urnyeen*.

PROCEEDINGS
OF THE
LINNEAN SOCIETY
OF
NEW SOUTH WALES.

WEDNESDAY, 31ST MARCH, 1897.

The Ordinary Monthly Meeting of the Society was held in the Linnean Hall, Ithaca Road, Elizabeth Bay, on Wednesday evening, March 31st, 1897.

Professor J. T. Wilson, M.B., President, in the Chair.

DONATIONS.

(Received since the Meeting in November, 1896.)

American Geographical Society—Bulletin. Vol. xxviii. (1896), Nos. 3-4. *From the Society.*

American Museum of Natural History, N. York—Bulletin. Vol. viii. (1896). Signs. 13-21, pp. 193-327 (Oct.-Dec.). *From the Museum.*

American Naturalist. Vol. xxx. (1896), Nos. 359-360 (Nov.-Dec.). Vol. xxxi. (1897), Nos. 361-362 (Jan.-Feb.). *From the Editor.*

American Philosophical Society—Proceedings. Vol. xxxv. No. 150 (Jan., 1896). *From the Society.*

Boston Society of Natural History—Proceedings. Vol. xxvii. pp. 7-74 (April, 1896). *From the Society.*

Bureau of Ethnology, Washington—Thirteenth Annual Report (1891-92). *From the Bureau.*

Denison University, Granville, Ohio—Bulletin of the Scientific Laboratories. Title-pages and Contents to Vols. i-viii; Vol. ix. Part i. (Dec., 1895). *From the University.*

Field Columbian Museum, Chicago—Ornithological Series. Vol. i. No. 1 (March, 1896): Zoological Series. Vol. i. Nos. 3-5 (May-June, 1896). *From the Museum.*

Johns Hopkins University—Circulars. Vol. xvi. No. 127 (Nov., 1896): Hospital Bulletin. Vol. viii. Nos. 70-71 (Jan.-Feb., 1897). *From the University.*

Michigan Fish Commission—Bulletin. No. 6 (1896). *From the Secretary.*

Missouri Botanical Garden—Seventh Annual Report (1895). *From the Director.*

Museum of Comp. Zool. at Harvard College, Cambridge, Mass.—Bulletin. Vol. xxviii. Nos. 2-3 (Oct.-Dec., 1896); Vol. xxx. Nos. 1-3 (Oct.-Nov., 1896): Annual Report, 1895-96. *From the Director.*

New York Academy of Sciences—Annals. Title page and Index to Vol. viii.; Vol. ix. Nos. 1-3 (June, 1896). *From the Academy.*

Rochester Academy of Science—Proceedings. Vol. iii. Brochure 1 (1896). *From the Academy.*

U. S. Department of Agriculture—Division of Entomology—Bulletin. New Series, No. 6. *From the Secretary for Agriculture.*

U. S. Geological Survey.—Fifteenth Annual Report (1893-94); Sixteenth Annual Report (1894-95). Parts ii.-iv.: Bulletin. Nos. 123-126, 128-129, and 131-134 (1895-96). *From the Director.*

Canadian Institute—Transactions. Vol. v. Part i. No. 9 (Oct., 1896). *From the Institute.*

Geological and Natural History Survey of Canada—Annual Report. New Series. Vol. vii. (1894) with seven Maps. *From the Director.*

Hamilton Association—Journal and Proceedings (1895-96). No. xii. *From the Association.*

* Natural History Society of Montreal—Canadian Record of Science. Vol. vii. Nos. 1-2-3 (1897). *From the Society.*

Nova Scotian Institute of Science—Proceedings and Transactions. Session 1894-95. Vol. ix. Part i. *From the Institute.*

Royal Society of Canada—Proceedings and Transactions. Second Series. Vol. i. (May, 1895). *From the Society.*

Museo Nacional de Buenos Aires—Anales. T. iv. (1895). *From the Director.*

Museo Nacional de Montevideo—Anales. vii. (1896). *From the Director.*

Australasian Journal of Pharmacy. Vol. xi. (1896), No. 132 (Dec.); Vol. xii. (1897), Nos. 133-135 (Jan.-March). *From the Editor.*

Pharmaceutical Journal of Australasia. Vol. ix. (1896), Nos. 11-12 (Nov.-Dec.); Vol. x. (1897), Nos. 1-2 (Jan.-Feb.). *From the Editor.*

Department of Agriculture, Brisbane—Bulletin (Second Series). Nos. 12-13 (1896-97). *From the Secretary for Agriculture.*

Geological Society of Queensland—Nine Geological Reports (Nos. 86, 100, 102, 103, 106, 107, 112, 114, and 116): Bulletin. Nos. 2, 3, and 5 (1895-97). *From the Government Geologist.*

Australian Museum, Sydney—Memoirs. Vol. iii. The Atoll of Funafuti, Ellice Group. Part i. (Dec., 1896), Part. ii. (Feb., 1897): Records. Vol. iii. No. 1 (Jan., 1897). *From the Trustees.*

Department of Mines and Agriculture, Sydney—Records. Vol. v. Part ii. (1897): "Australian Mining Standard: West Australian, and Sulphide Editions" (Aug., 1896, and Jan., 1897). Agricultural Gazette. Vol. vii. (1896), Parts 10-11 (Oct.-Nov.); Vol. viii. (1897), Parts 1-2 (Jan.-Feb.). *From the Hon. the Minister for Mines and Agriculture.*

Royal Society of New South Wales—President's Anniversary Address (May, 1896). By Professor David, B.A., F.G.S. *From the Author.*

"The Surveyor." Vol. ix. (1896), Nos. 11-12 (Nov.-Dec.); Vol. x. (1897), Nos. 1-3 (Jan.-March). *From the Editor.*

Department of Agriculture, Victoria—"Guides to Growers." Nos. 21, 23-26 and 30: List of Works, etc., by D. McAlpine. *From the Vegetable Pathologist.*

Gordon Technical College, Geelong—The Wombat. Vol. i. No. 4 (July): Vol. ii. Nos. 5-6 (Nov., 1896; Feb., 1897). *From the College.*

Royal Geographical Society of Australasia, Victorian Branch—Transactions and Proceedings. Vols. iii.-iv. (1885-86); Vol. v. Part i. (1888); Vol. vi. (1888-89); Vol. vii. Part ii. (1890); Vol. ix. (1891-92); Vols. xi.-xiii. (1894-96). *From the Society.*

Royal Society of Victoria—Proceedings. Vol. ix. (1896). New Series. *From the Society.*

University of Melbourne—Examination Papers—Matric., Nov., 1896; Annual, Oct. and Dec., 1896. *From the University.*

Victorian Naturalist. Vol. xiii. (1896-97), Nos. 8-11 (Nov.-Feb.). *From the Field Naturalists' Club of Victoria.*

Royal Society of South Australia—Transactions. Vol. xx., Part ii. (Dec., 1896). *From the Society.*

South Australia—Reports on Arltunga Gold Field and Hart's Range Mica Field, &c. By H. Y. L. Brown, Govt. Geologist. Also Contributions to the Palæontology of S. Australia. By R. Etheridge, Junr. (1897). *From H. Y. L. Brown, Esqr., F.G.S.*

Bureau of Agriculture, Perth, W.A.—Journal. Vol. iii. (1896), Nos. 24-30 (Oct.-Dec.); Vol. iv. (1897), Nos. 1-5 (Jan.-Feb.). *From the Bureau.*

Cambridge Philosophical Society—Proceedings. Vol. ix. Part iv. *From the Society.*

Entomological Society of London—Transactions, 1896. Parts iv.-v. *From the Society.*

Geological Society, London—Quarterly Journal. Vol. lii. (1896), Part iv. (No. 208); Vol. liii. (1897), Part i. (No. 209); Index to Vols. i.-l. Part i. A-La. (1897): Geological Literature, 1896. *From the Society.*

Journal of Conchology. Vol. viii. No. 9 (Nov., 1896), No. 10 (Jan., 1897). *From the Conchological Society of Great Britain and Ireland.*

Royal Microscopical Society—Journal, 1896. Parts 5-6 (Oct. and Dec.). *From the Society.*

Royal Physical Society, Edinburgh—Proceedings. Session 1895-96. Vol. xiii. Part 2. *From the Society.*

Royal Society, London—Proceedings. Vol. lx. Nos. 360-366 (Sept., 1896; Feb., 1897). *From the Society.*

Zoological Society of London—Abstract, 17th Nov., 1st Dec., 15th Dec., 1896; 19th Jan., 1897; 2nd Feb., 16th Feb.: Proceedings, 1896. Part iii. (Oct.): Transactions. Vol. xiv. Part 2. (Oct., 1896): List of the Animals, 1896. Ninth Edition. *From the Society.*

Pamphlet entitled "Survey of Fishing-Grounds, West Coast of Ireland, 1890-91." Report on the Rarer Fishes (4to., Dublin, 1896). By E. W. L. Holt, and W. L. Calderwood, F.R.S.E. *From W. L. Calderwood, Esq.*

Bombay Natural History Society—Journal. Vol. x (1896) No. 4.
From the Society.

Geological Survey of India—Records. Vol. xxix. Part 4 (1896).
From the Director.

Perak Government Gazette. Vol. ix. (1896), Nos. 25-30 (Oct.-Dec.); Vol. x. (1897), Nos. 1-5 (Jan.-Feb.). *From the Government Secretary.*

College of Science, Imperial University, Japan—Journal. Vol. x. Part 1. *From the Director.*

Faculté des Sciences de Marseille—Annales. T. iv. Fasc. 4 (1895); T. v. Fascs. 1-3 (1896). *From the Faculty.*

Journal de Conchyliologie. Vol. xlii. Nos. 1-4 (1894). *From the Editor.*

Muséum d'Histoire Naturelle, Paris—Nouvelles Archives. 3^e Série. T. vii. Fasc. 2 (1895): Bulletin. Année, 1896, Nos. 2-6.
From the Museum.

Société Botanique de Lyon—Annales. T. xviii. (1891-92); T. xix. (1893-94); T. xx. (1895). *From the Society.*

Société Entomologique de France—Annales. Année 1894. Vol. lxiii. Nos. 1-4; Année 1895. Vol. lxiv. Nos. 1-4. *From the Society.*

Société d'Horticulture du Doubs, Besançon—Bulletin. Sér. Illustrée. Nos. 10-14 (Oct., 1896-Feb., 1897). *From the Society.*

Société des Sciences, &c., du Hainaut—Mémoires et Publications. v^e Série. Tome vi. Année 1893. *From the Society.*

Société des Sciences Naturelles de l'Ouest de la France—Bulletin. T. v. Nos. 2-4 (1895); T. vi. Nos. 1-2 (1896). *From the Society.*

Société Linnéenne de Normandie—Bulletin. 4^e Série. Vol. ix. Année 1895: Mémoires. Vol. xviii. 2^e-3^e Fascs. (1895).
From the Society.

Société Zoologique de France—Bulletin. T. xx. Nos. 1-10 (1895); Mémoires. T. viii. Nos. 1-4 (1895). *From the Society.*

Pamphlet entitled "Géologie des Indes Anglaises" (8vo., Paris, 1895). Par G. Ramond. *From the Author.*

Pamphlet entitled "Sur la 3^{me} Campagne Scientifique de la Princesse Alice." Par S. A. S. le Prince Albert 1^{er} de Monaco (4to., 1896). *From the Author.*

Société Belge de Microscopie—Bulletin. xxiii^{me} Année (1896-97), 1-3^{me} Livs. *From the Society.*

Société Entomologique de Belgique—Annales. T. xxxix. (1895): Mémoires. iii., iv., v. (1895-96). *From the Society.*

Société Royale de Botanique de Belgique—Bulletin. Tomes xxii., xxiv.-xxvii.; xxix., xxxii.-xxxiii. (1883-94). *From the Society.*

Société Royale Linnéenne de Bruxelles—Bulletin. xxii^{me}, Année. Nos. 1-4 (Oct., 1896-Jan., 1897). *From the Society.*

Nederlandsche Dierkundige Vereeniging—Tijdschrift. 2^{de} Serie. Deel v. Afl. 1. *From the Society.*

Nederlandsche Entomologische Vereeniging—Tijdschrift voor Entomologie. xxxix. Deel (Jaarg., 1896), 3-4 Afl. *From the Society.*

Société Hollandaise des Sciences à Harlem—Archives Néerlandaises. T. xxx. (1896), 3^{me}-4^{me} Livs. *From the Society.*

Museo di Zoologia ed Anatomia comparata della R. Università di Torino—Bolletino. Vol. xi. Nos. 243-267, Title-page and Index. *From the Museum.*

Sylloge Algarum. Vol. iii. *Fucoxidee*; Pamphlet entitled "Phyceae Japonicae Novae" (4to., 1895), and Seventeen Pamphlets on Algae. Per G. B. de Toni. *From the Author.*

Archiv für Naturgeschichte. lxii. Jahrgang (1896), i. Band, 2-3 Heft. *From the Editor.*

Botanischer Verein in Landshut (Bayern)—xiv. Bericht. (1894-95). *From the Society.*

Gesellschaft für Erdkunde zu Berlin—Verhandlungen. Bd. xxiii. (1896), Nos. 4 u. 5: Zeitschrift. Bd. xxxi. (1896), No. 2. *From the Society.*

Königl. Biologische Anstalt auf Helgoland—Wissenschaftliche Meeresuntersuchungen. Neue Folge. Band i. Heft 2 (1896). *From the Commission.*

Königl. Böhmisches Gesellschaft der Wissenschaften in Prag—Jahresbericht für das Jahr 1895: Sitzungsberichte (Math.-Nat. Classe) 1895, i.-ii. *From the Society.*

Kaiserliche Leop.-Carol. deutsche Akademie der Naturforscher—Nova Acta. Bd. lxiv. Nr. 6 (1895); Bd. lxv. Nr. 2 (1895); Bd. lxvi. Nr. 2 (1895): Leopoldina. Heft xxxi. (1895). *From the Academy.*

K. K. Naturhistorisches Hof-Museum in Wien—Annalen. Band xi. Nr. 1 (1896). *From the Director.*

K. K. Zoologisch-botanische Gesellschaft in Wien—Verhandlungen. xlv. Bd. (1896), 8-10 Heft. *From the Society.*

Naturhistorischer Verein der Preussischen Rheinlande, Westfalens und des Reg.-Bez. Osnabrück—Verhandlungen. 52 Jahrgang, Zweite Hälfte (1895): 53 Jahrgang, Erste Hälfte (1896): Sitzungsberichte der Niederrheinischen Gesellschaft für Natur und Heilkunde zu Bonn. 1895, Zweite Hälfte; 1896, Erste Hälfte. *From the Society.*

Comité Géologique, St. Pétersbourg—Bulletins. T. xv. (1896), Nos. 3-4: Mémoires. Vol. xv. No. 2 (1896). *From the Society.*

L'Académie Impériale des Sciences de St. Pétersbourg—Bulletin. v^e Série. Tome vi. No. 1 (Jan., 1897): Annuaire du Musée Zoologique. 1896, No. 4. *From the Academy.*

Zoologischer Anzeiger. xix. Band (1896), Nos. 515-520 (Oct.-Dec.); Bd. xx. (1897), Nos. 521-523 (Jan.). *From the Editor.*

Russisch-Kaiserliche Mineralogische Gesellschaft zu St. Petersburg—Verhandlungen (2), xxxiii. Band, ii. Lief.; xxxiv. Bd. i. Lief. *From the Society.*

Société Impériale des Naturalistes de Moscou—Bulletin. Année 1896, No. 2. *From the Society.*

L'Académie Royale des Sciences, &c., de Danemark, Copenhague—Bulletin, 1896. Nr. 5. *From the Academy.*

Kongl. Universitets-Biblioteket, Upsala—Meddelanden från Mineralogisk-Geologiska Institution. Nos. 19-22 (1896): Bidrag till en Lefnadsteckning öfver Carl von Linné. Nos. iii.-iv. (1895-96): Five Inaugural Dissertations, 8vo. and 4to. (1896): Bulletin of the Geological Institution. Vol. ii. (1895). Part 2. No. 4. *From the University.*

Entomologiska Föreningen i Stockholm—Entomologisk Tidskrift. Arg. xvii. (1896). *From the Society.*

DESCRIPTIONS OF NEW SPECIES OF AUSTRALIAN LEPIDOPTERA, WITH NOTES ON SYNONYMY.

By OSWALD B. LOWER, F.E.S., &c.

BOMBYCINA.

LIMACODIDÆ.

DORATIPHORA BRACHYOPA, *n. sp.*

♂. 25 mm. Head, palpi, and collar dark reddish, face ochreous. Thorax and abdomen ochreous, tinged with fuscous-reddish, thorax lighter in middle. Antennæ ochreous, pectinations at greatest length $1\frac{1}{2}$, closely set. Legs deep reddish-fuscous, densely haired. Thorax beneath densely haired with ashy-grey-whitish. Forewings rather short, costa hardly arched, hind-margin somewhat bowed; dull silvery-whitish, basal two-thirds occupied by a deep reddish patch, somewhat obscure above inner margin, outer edge somewhat convex, with a fine darker fuscous marginal line; this line is continued right round the patch, but causes a sharp indentation above inner margin at $\frac{2}{3}$ from base; an obscure ochreous discal dot ringed with deep reddish at about $\frac{2}{3}$ above middle of disc; a fine blackish line from $\frac{5}{6}$ of costa to anal angle, strongly dentate on lower $\frac{3}{4}$, almost straight on upper fourth; a fine blackish hindmarginal line more or less interrupted on veins: cilia ashy-grey-whitish with a fine obscure darker line. Hindwings reddish-ochreous, with a darker line along hindmargin; cilia as in forewings.

Cairns, Queensland; two specimens in November.

SCOLIACMA (?) XANTHODELTA, *n. sp.*

♂. 20 mm. Head, palpi, collar, and abdomen yellow, abdomen infuscated. Thorax leaden-fuscous. Legs yellowish mixed with fuscous. Forewings elongate-triangular, costa somewhat sinuate

in middle, arched towards apex, apex rounded, hindmargin obliquely rounded; leaden-fuscous, markings dull yellow; a small basal patch, outer edge oblique, continued as a fine costal line throughout; a moderate triangular patch on costa beyond middle, beneath which is a moderate roundish spot: cilia leaden-fuscous. Hindwings light yellow; a broad fuscous hindmarginal band, becoming constricted at anal angle; cilia pale yellow.

Broken Hill, N.S. Wales; two specimens (at light) in September.

The insect under notice is doubtfully referable to *Scoliacma*.

SOROCOSTIA MONOZONA, n.sp.

♀. 17 mm. Head, thorax, and abdomen ashy-grey-whitish, antennæ fuscous, (palpi broken). Legs fuscous, ringed with white. Forewings elongate, moderate, dilated posteriorly; ashy-grey-whitish, costa irregularly edged with fuscous throughout; a well-defined short thick black outwardly oblique streak from costa at $\frac{1}{3}$ to middle of disc, ending on second tuft of scales; a faint similar line from middle of costa, extremity lost in general ground-colour; a third similar line from before apex, hardly perceptible; veins towards hindmargin irregularly irrorated with blackish: cilia ashy-grey-whitish. Hindwings fuscous-grey, becoming darker round apex; cilia pale grey, slightly infuscated round apex.

Blackwood, South Australia; two specimens in November.

Mr. Meyrick, to whom this and the following species were submitted, returned them as unknown to him.

SOROCOSTIA PLATYGONA, n.sp.

♀. 20 mm. Head, thorax, abdomen, palpi, and legs white, palpi 2, terminal joint very short, legs dusted with blackish. Forewings elongate-triangular, costa gently arched, hindmargin bowed, oblique; white; tufts white, anteriorly slightly infuscated; an obscure fuscous dot on costa near base; a second more distinct on costa at $\frac{1}{5}$ from which proceeds an outwards-curved twice

sinuate fine fuscous line to inner margin at $\frac{1}{4}$; three minute black dots on costa in middle; a well-defined broad outwardly oblique fascia from $\frac{3}{5}$ of costa to middle of disc, thence continued obliquely inwards to just beyond middle of inner margin, outer edge more or less strongly edged with black; a thick irregular outwards-curved pale fuscous irregularly waved line from just before apex to just before anal angle; a few fuscous scales before hindmargin; a blackish hindmarginal line: cilia whitish. Hindwings white, slightly infuscated on apical portion; cilia white, with an indistinct grey line at base.

Mackay, Queensland; one specimen in December. It is an easily recognised species by the >-shaped fascia.

ANESTIA TRISSODESMA, n.sp.

♂. 16 mm. Head, antennæ, palpi, thorax, abdomen and legs dark fuscous, more or less finely dusted with white, patagia whitish. Forewings elongate-triangular, strongly dilated, costa gently arched posteriorly, hindmargin obliquely rounded; fuscous; three moderately broad whitish transverse fasciæ; 1st from $\frac{1}{4}$ of costa to $\frac{1}{4}$ of inner margin, becoming blotch-like on costa, narrowed on lower $\frac{2}{3}$; 2nd from beyond middle of costa to middle of inner margin, outer edge marked by an irregularly dentate or waved line; 3rd narrowed from just before apex to anal angle, with a slight indentation above and below middle, and becoming broader at anal angle; space between 2nd and 3rd fasciæ pale bluish, excepting upper $\frac{1}{3}$, which is fuscous: cilia fuscous, tips darker. Hindwings clear orange, becoming slightly fuscous around apex; cilia fuscous, along inner margin yellowish.

Broken Hill, N.S. Wales; one specimen (at light) in June.

GEOMETRINA.

HYDRIOMENIDÆ.

MESOPTILA ANTHRACIAS, n.sp.

♂. 24 mm. Head, palpi, antennæ, thorax, and abdomen dark fuscous, palpi five times breadth of eye. Antennal ciliations $1\frac{1}{2}$.

Legs fuscous-whitish, tibiae and tarsi blackish, ringed with ochreous-whitish. Forewings elongate triangular, costa nearly straight, hindmargin bowed, waved; dark fuscous, mixed with blackish; a raised tuft of blackish scales in middle of disc; a ridge like tuft of similar scales towards base near inner margin; an obscure thick fuscous curved line from about $\frac{1}{4}$ of costa to $\frac{1}{4}$ of inner margin; a small pale yellow cuneiform spot on costa at about $\frac{3}{4}$, from which proceeds a dentate double fine black line curved outwards and ending on inner margin at $\frac{3}{4}$; the ground colour on costa beyond the yellow spot much darker, the anterior portion of the double black line not reaching costa, but deflected downwards and continued as a black interrupted line just beneath costa to near base, obscure towards base; veins towards hindmargin neatly outlined with black, each with a minute yellow spot at hindmarginal extremity: cilia dark reddish-fuscous. Hindwings with hindmargin rounded, crenulate; dark fuscous, becoming lighter on median third; an erect (seemingly expansible) tuft of scales in middle of disc; three well defined wavy black lines from middle of inner margin, two upper terminating in tuft of scales, lower one curved outwards and continued to costa at about $\frac{3}{4}$; cilia as in forewings, hairs on inner margin whitish.

This is the second species recorded from Australia. Meyrick was unacquainted with the male and consequently could not give the characters in full; the additional generic characters will therefore read:—Antennal ciliations of the male $1\frac{1}{2}$, palpi porrected, about 5, second joint loosely haired, terminal joint distinct, somewhat claviform, and slightly recurved. The forewings appear to have three tufts of scales, one at about $\frac{1}{3}$ from base in middle, a larger one in middle of disc, and a ridge-like patch towards base near inner margin. The long palpi give the species a most curious and distinct appearance. It is not like *Hydriomena bruyata*, Gn., at first sight.

Sale, Victoria. The single specimen is in the collection of Mr. G. Lyell, Junr., of Gisborne, Victoria.

HETEROCHASTA LASIOPLACA, n.sp.

♂. 30 mm. Head, antennæ, palpi, thorax, and abdomen fuscous, palpi about $1\frac{1}{2}$, snow-white at base beneath and at apex of terminal joint, terminal joint about $\frac{1}{2}$ length of second. Antennal ciliations $\frac{1}{4}$. Abdomen with pairs of dark fuscous spots on segments. Legs ochreous-whitish, banded with fuscous. Forewings elongate-triangular, hindmargin hardly waved, bowed, oblique; dull fuscous-greenish, with numerous waved darker fuscous transverse lines; outer edge of basal patch indicated by a moderately thick correlated band, slightly sinuate outwards above middle, from about $\frac{1}{8}$ of costa to $\frac{1}{5}$ inner margin; median band formed by two dark fuscous bands of three lines each, separated by a clear snow-white space, becoming light ferruginous on lower $\frac{1}{2}$; anterior edge from just beyond $\frac{2}{5}$ of costa to middle of inner margin; posterior edge from before $\frac{3}{4}$ of costa to $\frac{3}{4}$ of inner margin, with a strong sharp projection in middle and a less prominent one above middle, followed throughout more or less by a fine whitish line; a black lunate discal mark in the white space above middle touching anterior edge of band, subterminal and submarginal lines waved, irregular, blackish, a fine blackish hindmarginal line separated into small spots by minute white spots at extremities of veins: cilia ochreous-grey barred with black. Hindwings with the hindmargin rounded; dull leaden becoming paler towards base; cilia as in forewings.

Brisbane, Queensland; one specimen. Distinct by the hindwings and snow-white spot of forewings.

STERRHIDE.*STERRHA RHODOCOSMA*, n.sp.

♂. 24 mm. Head, face, palpi, and thorax rosy-carmine, abdomen whitish. Antennæ ochreous, pectinations at greatest length 2. Legs fuscous, anterior coxæ tinged with rosy-carmine, posterior pair ochreous-whitish. Forewings triangular, costa nearly straight, apex rounded, hindmargin obliquely bowed; pale whitish-ochreous, thickly irrorated with rosy-carmine, so as to appear rosy-carmine,

three darker rosy-carmine darker transverse fasciæ; 1st from base to $\frac{1}{5}$, outer edge nearly straight, somewhat waved, indicating basal patch; 2nd broad from about middle of costa to middle of inner margin, indicating median shade; 3rd narrow, waved from costa at $\frac{2}{3}$ to inner margin near anal angle; an obscure rosy-carmine dot above middle, midway between last two fasciæ; subterminal and submarginal lines darker carmine, thick and indistinct: cilia pale ochreous, suffusedly mixed with rosy-carmine. Hindwings pale whitish-ochreous; two obscure fuscous transverse median bands, hardly perceptible in some specimens; cilia pale whitish-ochreous.

Torrens Island and Semaphore, South Australia; beaten from *Salicornia arbuscula* in October.

A distinct and beautiful species taken by Mr. Harold Lower. The lustre of the forewings of this species when fresh is magnificent, but after death this fades to a dull rosy-carmine.

MONOCTENIADE.

MNESAMPELA PETROCHROA, n.sp.

♀. 3.3 mm. Head, thorax, and antennæ greyish-ochreous, abdomen white with minute black scattered scales; five or six pairs of black dots placed laterally on underside at juncture of each segment. Legs whitish, anterior tibiæ and tarsi ringed with blackish, palpi blackish. Forewings triangular, apex prominent, hindmargin slightly bowed; light greyish-ochreous, with fine indistinct irregular fuscous strigulæ; costa very finely whitish, strigulated with fuscous; an indistinct blackish suffusion on costa at base; a curved series of five small black dots, one on costa at $\frac{1}{5}$, two close together immediately below, one in middle, and one above inner margin; an almost straight series of similar dots, edged posteriorly with white and placed on a pale ferruginous shade, from before apex to about $\frac{1}{3}$ of inner margin: cilia silvery-white, a pale ferruginous indistinct line along inner margin and more or less continued along basal half of cilia to near apex. Hindwings greyish-fuscous, somewhat purplish-tinged, becoming greyish-ochreous towards inner margin, hairs on inner margin

white; cilia and markings as in forewings, but dots not placed on ferruginous shade.

Hoyleton, South Australia; one specimen taken by Mr. E. Guest in May.

NOCTUINA,

PRAXIS MACROPA, n.sp.

♂-♀. 40, 42 mm. Head, palpi, and thorax reddish-ochreous, thorax in middle grey-whitish, abdomen grey. Antennæ ochreous; ciliations about 6 at greatest breadth. Legs fuscous, posterior pair pinkish-white. Forewings moderate, elongate, dilated posteriorly; costa arched at base, thence nearly straight, apex rounded, hindmargin obliquely rounded; ashy-grey, mixed with reddish-ochreous and finely irrorated with black and dark fuscous; a fine black strongly thrice dentate line from about $\frac{1}{4}$ of costa to $\frac{1}{3}$ inner margin; a pale ochreous elongate spot, finely edged with black, touching middle dentation of first mentioned line; a larger more reddish similar spot above and slightly beyond, also edged with black; a reddish-ochreous reniform spot edged with black at end of cell; a strongly dentate black line from beneath costa at about $\frac{4}{5}$ to $\frac{2}{3}$ of inner margin, edged posteriorly by its own width of pale ochreous-reddish; a similar but lighter parallel line (indicating subterminal) near and beyond from costa at $\frac{5}{6}$ to anal angle, interspace bright reddish-ochreous: cilia ochreous-reddish, chequered with blackish. Hindwings fuscous-grey; cilia grey-whitish, reddish-tinged on basal $\frac{1}{2}$.

Broken Hill, N.S.W.; three specimens taken at electric light in May.

The antennal pectinations of this species are so filiform that they curl up into an inextricable mass when the insect is dry; they can, however, be readily rearranged by relaxing.

ACONTIA CYANIPIA, n.sp.

♂. 28 mm. Head and thorax white. Antennæ fuscous, ciliations $\frac{1}{2}$. Abdomen ochreous-yellow. Legs and palpi fuscous, tibiae ringed with white. Palpi strongly recurved, second joint

whitish externally. Forewings elongate, dilated posteriorly, costa nearly straight, hindmargin obliquely rounded; white, slightly ochreous-tinged; a fine blackish dot at base in middle; two narrow elongate, partly connected, fuscous spots along costa, extending from base to before middle and followed on costa by a pale fuscous suffusion to $\frac{3}{4}$, terminated by a small dark fuscous spot; a large erect irregular somewhat cuneiform bluish-fuscous patch; from inner margin before anal angle to more than $\frac{1}{2}$ across wing, apex obtuse; a narrow inwards-curved whitish-ochreous discal lunule, finely edged with black; a moderate somewhat rhomboid pale bluish patch immediately beyond, containing two black teeth, their apices directed inwards, on posterior edge, below which the bluish colour is continued as an irregular streak to anal angle, hindmarginal area beyond chocolate, with a suffused patch of ground-colour on costa; a hindmarginal row of dentate black dots edged posteriorly by fine dots of ground-colour: cilia chocolate, tips mixed with whitish. Hindwings pale yellow, broadly suffused with light fuscous round hindmargin; cilia yellowish-ochreous with a fuscous parting line, except towards anal angle.

Broken Hill, N.S. Wales; one specimen in January.

BRITHIA (?) *COSMOPIS*, n.sp.

♀. 23 mm. Head, palpi, and anterior legs fuscous, antennæ ochreous. Thorax ochreous-fuscous, median third silvery-white. Abdomen yellow, becoming ochreous-whitish on anterior segments. Forewings triangular, costa nearly straight, hindmargin hardly bowed; ochreous-fuscous; a thick dull leaden-metallic streak along costa from base to apex, attenuated posteriorly, shaded beneath by more than its own width with light ochreous, suffused at extremities; a very broad silvery-white streak along inner margin from base to anal angle, suffused with pale ochreous along extreme inner margin and edged above by a line of darker ochreous-fuscous; two small silvery-white cuneiform spots just above extremity of this streak, upper one largest; a fine curved blackish line from beneath costa just below apex to upper extremity of silvery-white streak; hindmarginal area beyond bluish-lead with a faint

whitish median line; a fine blackish line terminating before hind-margin: cilia bluish-leadен with two darker parallel lines. Hindwings bright orange-yellow, with a broad blackish hindmarginal band, attenuated above apex; cilia greyish-ochreous with a black median line well defined.

Cape York, Queensland; two specimens in January.

PYRALIDINA.

BOTYDIDÆ.

METALLARCHA ZYGOSEMA, n.sp.

♀. 20 mm. Head and thorax whitish-yellow, abdomen yellowish, antennæ, palpi, and legs fuscous, posterior legs ochreous. Forewings elongate-triangular, light brown, with pale yellow markings outlined with darker brown; a large irregular cuneiform patch from base below costa to just before $\frac{1}{3}$ of wing, its lower edge emitting a long slender streak along inner margin to anal angle, posteriorly attenuated; a large irregular lunate mark in middle of wing, connected with basal patch anteriorly by a short bar, very strongly indented on middle portion, upper extremity obtuse, lower acute; a rather broad irregularly edged curved fascia from costa just before apex to inner margin above anal angle but not quite reaching it, anterior edge with a slight projection below middle; a narrow yellowish hindmarginal line: cilia pale yellow, deeper at base. Hindwings pale fuscous, with a pale yellow basal patch sending a projection from below middle towards inner margin; an indistinct elongate black spot in yellow patch; cilia pale yellow, deeper at base.

Hoyleton, S.A.; one specimen (Coll. E. Guest) in December. The specimen is somewhat abraded, consequently the description may require some latitude for comparison.

SCOPARIADÆ.

SCOPARIA LICHENOPA, n.sp.

♂-♀. 18, 21 mm. Head, palpi, thorax, antennæ, and legs ashy-grey-whitish, posterior legs grey-whitish, abdomen grey, three

anterior segments orange-yellowish. Forewings moderate, elongate, gently dilated; ashy-grey-whitish; markings black, suffused; a narrow outward-curved fascia from about $\frac{1}{4}$ of costa to $\frac{1}{4}$ of inner margin, a fine line along median fold from base to fascia but hardly reaching it; a very oblique irregular fascia from costa before apex to about $\frac{2}{3}$ of inner margin, almost obliterated by ground-colour in some specimens; a small rounded white spot at end of cell, edged more or less with blackish; a hindmarginal row of black teeth: cilia ashy-grey-whitish with blackish points. Hindwings greyish-fuscous, becoming lighter towards base; cilia greyish-fuscous.

Broken Hill, N.S. Wales; four specimens in April and May. The present species is somewhat allied to *polysticha*, Lower.

TINEINA.

CECOPHORIDÆ.

PHILOBOTA XANTHOCOMA, n.sp.

♂-♀. 13, 15 mm.. Head, palpi, antennæ, thorax, and abdomen dark fuscous, anal tuft yellow. Legs dark fuscous, tibiæ and tarsi with yellowish bands. Forewings moderate, costa hardly arched, apex rounded, hindmargin obliquely rounded; dark fuscous with yellowish markings; a moderate irregular spot on costa about middle, immediately preceded by two small round black dots; a similar yellowish spot on costa at about $\frac{2}{3}$, and another more obscure immediately below on anal angle, separated in middle of wing by a line of ground-colour, with an obscure black spot at extremity; an irregular thick streak along hindmargin, with a projection inwards in middle: cilia dull fuscous tinged with ochreous around anal angle. Hindwings dark fuscous; cilia yellow, becoming fuscous round apex.

Semaphore, S.A.; several specimens taken by Mr. Harold Lower in September. The cilia of the hindwings are a good distinction.

F LINOSTICHA CREMNODISEMA, n.sp.

♂-♀. 13, 18 mm. Head dull ochreous. Thorax fuscous. Antennæ, legs, and palpi fuscous, palpi greyish internally, middle

and posterior legs ochreous. Forewings moderate, costa gently arched, apex rounded, hindmargin obliquely rounded; dull fleshy ochreous, minutely irrorated with black scales which tend to coalesce and obliterate the markings; an obscurely marked double black dot in disc just before middle; a similar but more distinct one in a line with first just beyond middle, beneath which the blackish scales coalesce and appear to form a more or less ill-defined blackish suffusion: cilia fuscous mixed with fleshy-red. Hindwings greyish-fuscous; cilia greyish.

Broken Hill, N.S. Wales; two specimens (at light) in April. An obscure species.

COMPSOTROPHA HABRODELTA, n.sp.

♀. 16 mm. Head, palpi, and thorax snow-white, thorax with a narrow dark fuscous anterior band. Legs ochreous-whitish, anterior pair fuscous, tarsi ringed with white; abdomen greyish. Antennæ fuscous, basal joint white beneath. Forewings moderate, hardly dilated, costa nearly straight, apex rounded, hindmargin obliquely rounded; snow-white; costal edge posteriorly ochreous; a narrow black oblique fascia close to base, somewhat dilated on costa; a narrow oblique irregular orange fascia from costa at $\frac{3}{4}$ to middle of inner margin, edged on both sides with black, narrowed on costa; a similar short fascia from anal angle to middle of posterior edge of previously mentioned fascia, becoming blackish on anal angle and enclosing a spot of ground-colour on inner margin; a narrowed suffused blackish hindmarginal streak, not reaching anal angle: cilia ochreous-orange, strongly mixed with blackish. Hindwings with apex somewhat pointed; light greyish-fuscous; cilia pale yellow.

Gisborne, Victoria; one specimen in February (Coll. G. Lyell, Junr.). Near *xanthodelta*, Meyr.

♂ CÆSYRA HABROPIS, n.sp.

♂. 20 mm. Head and palpi orange-yellow. Legs, thorax, abdomen, and antennæ purplish-fuscous, posterior legs orange-yellow. Forewings moderate, costa gently arched, apex round-

pointed, hindmargin obliquely rounded; bright orange-yellow; a thick fuscous-purple basal patch continued along costa to slightly beyond middle, posteriorly attenuated, a very broad fuscous-purple hindmarginal band occupying apical third of wing, edged anteriorly by a waved, indented in middle, darker fuscous line; the central portion of band is occupied by a bright rosy-purple patch: cilia fuscous-purple. Hindwings bronze-yellow; cilia fulvous, darker at base.

Near Rockhampton, Queensland; one specimen in November. Nearest *seleniaca*, Meyr.

COESYRA GRAMMOPHORA, n.sp.

♂. 15 mm. Head, palpi, and thorax orange, antennæ blackish, ciliations 1; legs ochreous, anterior and middle pair infuscated; abdomen dark fuscous, anal tuft orange. Forewings moderate, costa gently arched, apex hardly pointed, hindmargin obliquely rounded; yellow; markings black, a thick basal fascia, its outer edge hardly curved; a thick somewhat oblique fascia from before middle of costa to middle of inner margin; dilated on lower half; a similar fascia from about $\frac{3}{4}$ of costa to anal angle, connected above middle by a fine irregular line from middle of former fascia; a fine blackish hindmarginal line joining fascia at anal angle, the markings, with the exception of basal fascia, forming the letter W on wing, the yellow spaces on costal and inner margin tinged with orange: cilia blackish on costa and on anal angle orange. Hindwings fuscous, lighter towards base; cilia fuscous.

Gisborne, Victoria; one specimen on dry grass at dusk in January.

At first sight not unlike a dwarfed specimen of *Peltophora argutella*, Zeller. The curious W-shaped mark on the forewings is a very noticeable characteristic.

XYLORYCTIDÆ.

SCIEROPEPLA (?) PHOTINODES, n.sp.

♀. 22 mm. Head and thorax blackish-fuscous, abdomen fuscous, segmental rings broad, reddish-ochreous, sides and under-

side silvery-white, palpi fuscous, internally snow-white, terminal joint nearly 1, basal joint slightly roughened externally. Anterior legs dark fuscous, coxæ sprinkled with white; posterior legs greyish-ochreous. Antennæ whitish, basal joint fuscous. Forewings elongate, costa strongly arched towards base, thence nearly straight, apex hardly pointed, hindmargin obliquely rounded; shining brassy-metallic, iridescent in some lights; a narrow snow-white costal streak edged beneath with fuscous, from about $\frac{1}{3}$ to near apex, broadest in middle, attenuated at extremities; veins towards hindmargin outlined with dark fuscous; a large dark fuscous discal spot in middle at about $\frac{1}{3}$, preceded by a dark fuscous dot; a similar but smaller roundish spot in a line with the two preceding dots at about $\frac{2}{3}$; a suffused streak along inner margin throughout; all these markings more or less mixed with whitish scales: cilia shining fuscous, with a whitish basal line and a darker fuscous median line. Hindwings shining grey, lighter towards base; cilia grey-whitish, with a dark ochreous basal line, more pronounced round apex.

Hoyleton, S.A.; two specimens taken by Mr. E. Guest in November.

GELECHIADÆ.

F GELECHIA PLATYLEUCA, n.sp.

♀. 17 mm. Head, palpi, antennæ, thorax, legs, and abdomen dark fuscous, posterior legs greyish. Forewings elongate, moderate, costa gently arched, apex rounded, hindmargin obliquely rounded; dark fuscous; a broad white streak along costa from base to apex, attenuated at apex; an obscure narrow fuscous suffusion on extreme costal edge beyond middle: cilia dark fuscous, becoming lighter round anal angle. Hindwings dark fuscous, becoming lighter towards base; cilia fuscous.

Elizabeth Bay, Sydney, N.S. Wales; two specimens in October.

GELECHIA PORPHYROLOMA, n.sp.

♂-♀. 15-18 mm. Head, thorax, antennæ, and palpi yellow, terminal joint of palpi except apex purple-fuscous. Legs fuscous,

coxæ pale ochreous. Abdomen greyish. Forewings moderate, rather narrow; costa gently arched, apex round-pointed, hindmargin obliquely rounded; yellow; a purple-fuscous outwards-curved hindmarginal band from anal angle to costa near apex, becoming blackish on anterior edge, especially on lower $\frac{1}{2}$: cilia greyish-fuscous, becoming yellowish at base, in some specimens wholly yellow round anal angle. Hindwings and cilia grey.

Port Victor, S. Australia; five specimens in November.

It is nearest *heliochrysa*, Meyr., but with the thorax wholly yellow; it is not unlike *Eulechria malacoptera*, Meyr., an *Æcophorid*.

GLYPHIPTERYGIDÆ.

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GLYPHIPTERYX POLYCHROA, n.sp.

♂. 12 mm. Head, antennæ, and thorax fuscous, palpi whitish with blackish rings beneath. Abdomen blackish. Legs fuscous. Forewings moderate, elongate, costa gently arched, hindmargin gently bowed; deep golden-ochreous; a curved dull whitish-fuscous fascia, from $\frac{1}{3}$ costa to $\frac{1}{3}$ inner margin; a similar fascia from before $\frac{1}{3}$ of costa to $\frac{1}{3}$ inner margin, upper $\frac{2}{3}$ filled with metallic-coppery tint; two small metallic-coppery spots on costa, before and beyond middle; an ochreous-whitish tooth on costa before apex, with two or three connected metallic-coppery spots immediately beneath; an ochreous-whitish tooth at apex, followed beneath by a metallic-coppery dot-like hindmarginal line ending on a dense black elongate patch above anal angle; in the black patch are placed three coppery-metallic equidistant spots: cilia grey-whitish, basal half golden-ochreous. Hindwings dull golden-ochreous; cilia greyish, basal half fuscous.

Melbourne, Victoria; one specimen in December.

In the *imetalla* group.

LITHOCOLLETIDÆ.

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LITHOCOLLETIS DISMOCHRYSA, n.sp.

♂-♀. 3.5 mm. Head, legs, thorax, and abdomen blackish, face and collar shining brassy-metallic, abdomen beneath sprinkled

with brassy-metallic, especially on three anal segments, which become wholly brassy. Antennæ black, terminal $\frac{3}{4}$ white. Forewings narrow, apex acute, hindmargin obliquely rounded; black, with three equidistant golden-metallic straight fasciæ, 1st from $\frac{1}{3}$, 2nd from middle, 3rd from $\frac{3}{4}$ of costa, and all ending on inner margin; base of wing somewhat golden-metallic; a short inwardly oblique golden-metallic tooth at apex, reaching about $\frac{1}{2}$ across wing: cilia black, terminal half white. Hindwings very narrow, somewhat linear, blackish, thinly scaled; cilia six times as broad as wing, blackish.

Broken Hill, N.S. Wales; bred freely in March, from plants.

Mr. Meyrick, who kindly identified this and several of the other species mentioned in this paper, stated some time ago in the Proceedings of the Society that the genus *Lithocolletis* was unrepresented in Australia, but later he was able to describe a new species under the name of *aglaazona*, which at the time he remarked was not truly indigenous, as the larvæ were found feeding on a species of *Desmodium*, one of the *Leguminosæ*, from which he inferred that the species was introduced with its food plant. In the present species it is a curious coincidence that the larvæ were first found by Dr. Blaxland feeding on *Hardenbergia ovata*, also one of the *leguminosæ*, consequently I think that we have discovered a truly indigenous species, as it seems hardly probable (although possible) that the larva would feed on an indigenous plant, unless attached to the same. It may be an adaption to circumstances, but I hardly think so, as in close proximity were growing *Cassia Brewsteri*, and *Hardenbergia pentaphylla*, neither of which shewed any sign of the larva, whereas the food plant was attacked in a most prolific manner.

PLUTELLIDÆ.

PLUTELLA PARACYCLA n.sp.

♂-♀. 22, 25 mm. Head, palpi, antennæ, and thorax white; antennal ciliations 1, second joint of palpi beneath fuscous, densely rough-haired, abdomen greyish, ochreous-tinged. Legs

fuscous, posterior pair greyish. Forewings elongate, dilated posteriorly, costa gently and evenly arched, apex rounded, hindmargin extremely obliquely rounded; pale whitish-ochreous; costal edge pale ochreous throughout, except at base which is fuscous; a fine fuscous dot in disc at $\frac{1}{3}$, a second obliquely above and beyond; a moderate black dot at end of cell; a row of small black dots from just beneath costa at $\frac{4}{5}$ evenly curved around hindmargin and ending on anal angle: cilia rather broad, pale greyish-ochreous. Hindwings greyish; cilia as in forewings

Var. A. All markings obsolete, except dot at end of cell.

Broken Hill, N.S. Wales; four specimens in June.

NOTES ON SYNONYMY.

The following notes on synonymy have been compiled from personal inspection of the types. I am also indebted to Kirby's Catalogue of the *Heterocera* for several.

RHOPALOCERA.

IALMENUS DAMELI, Semp.

Mus. Godf. Lep. xiv. 166, 1878.

I believe this species to be identical with the insect described by Dr. T. P. Lucas (Proc. Roy. Soc. Queensland, vi. 156, figs. 1-2, 1889) under the name of *Ialmenus Illidgei*, which Miskin considers to be a geographical form of *ictinus*, Hew., a decision however with which I disagree.

HESPERILLA DIRPHIA, Hew.

Descr. Hesp. p. 38, n. 2, 1868; Exot. Butt. v. Hesp. and Cyclop. f. 1-3, 1874: ♂. *Hesperilla trimaculata*, Tepper, Trans. Roy. Soc. S.A. iv. p. 32, t. 2, f. 4, 1881: ♀. *Hesperilla quadrimaculata*, Tepper, l.c. t. 2, f. 2, 1881.

It will be seen that the male and female were described under different names.

PAMPHILA GRACILIS, Tepper.

Trans. Roy. Soc. S.A. iv. p. 34, t. 2, fig. 7, 1882.

I am strongly of opinion that this species is identical with Hewitson's *Astictopterus* (*Cyclopides*) *Cynone* (Ex. Butt. f. 17, 1874). Unfortunately Mr. Tepper does not possess the type, but the balance seems in favour of Hewitson. The species is somewhat local and erratic in its appearance; my brother, Mr. Harold Lower, took it very commonly at the Semaphore, South Australia, in March.

HESPERILLA ATRALBA, Tepper.

Trans. Roy. Soc. S.A. iv. p. 33, t. 2, f. 5, 1881; *Telesto dactyliota*, Meyr., Proc. Linn. Soc. N.S.W. (2), ii. p. 831, 1887.

It will be seen that Tepper's name has priority.

TARACTROCERA FLAVOVITTATA, Latr.

Hesperilla flavovittata, Latr., Enc. Meth. ix. 768, n. 114, 1819 : *Apaustus* (*Ancylonypha*) *agraulia*, Hew., Descr. Hesp. p. 45, n. 3, 1868 ; Olliff, Ann. Mag. N.H. (6), i. p. 360, t. 20, ff. 3, a.b., 1888 : *Pamphila sunias*, Feld., Sitzb. Ak. Wiss. Wien, Math. Nat. Cl. xl. p. 462, n. 54, 1860 : *Hesperilla bifasciata*, Tepper, Trans. Roy. Soc. S.A. iv. p. 32, t. 2, f. 4, 1881.

HETEROCERA.

AGARISTA ALBAMEDIA, Lucas.

P.L.S.N.S.W. (2) vi. 301, 1891 : *A. tetrapleura*, Meyr., Trans. Roy. Soc. S.A. xiv. 194, 1891.

AGARISTA TROPICA, Lucas.

P.L.S.N.S.W. (2) vi. 302, 1891 : *A. platyrantha*, Meyr., Trans. Roy. Soc. S.A. xiv. 195, 1891.

The descriptions of Lucas and Meyrick were, as will be seen, both published in the same year; but I believe the Linn. Society's Proceedings were published first, consequently I assume Lucas's name has priority.

AGARISTA CONTORTA, Walk.

Cat. Lep. Het. B.M. p. 45, 1864: *Agarista casuarinæ*, Scott, Austral. Lep. i. p. 24, t. 8, 1865.

AGARISTA TRISTIFICA, Hb.

Eutactis tristifica, Hubn., Zutr. Ex. Schmett. i. p. 28, ff. 165, 166, 1818: *Agarista Lewinii*, Boisd., Voy. Astrolabe, Lep. p. 176, 6, 1832.

PORINA AUSTRALIS, Walk.

Oxycanus australis, Walk., Bomb. 1574: *Pielus maculosus*, Feld., Reis. Nov. pl. lxxxii. 1: *P. Kershawi*, Lucas, P.L.S.N.S.W. (2) vi. 282, 1891.

LITHOSIA PRISTINA, Walk.

Cat. Lep. Het. B.M. xxxv. p. 1885 (1866): *L. chionora*, Meyr., P.L.S.N.S.W. (2) i. p. 702, 1886.

CALLIGENIA PLACENS, Walk.

Barsine placens, Walk., B.M. Cat. xxxi. 251, 1864: *Calligenia cyclota*, Meyr., P.L.S.N.S.W. (2), p. 705, 1886.

CALLIGENIA MELITAUULA, Meyr.

P.L.S.N.S.W. (2), i. 705, 1886: *Mitochrista simulans*, Butl., Trans. Ent. Soc. Lond. p. 382, 1886.

CLUACA RUBRICOSTA, Walk.

B.M. Cat. 208, 1864: *Castulo binotata*, Walk., Char. Und. Lep. Het. p. 65, 1869.

Kirby places the species first in the family *Lithosiidae* (p. 298), and later in the *Liparidae* (p. 491), a rather misleading effort.

PHILENORA UNDULOSA, Walk.

Acontia undulosa, Walk., Noct. 792: *Philenora undulosa*, Ros., Ann. Mag. N.H. (5), xvi. 382, 1885: *Termessa Lyelliana*, Lower, Trans. Roy. Soc. S.A., p. 148, 1893.

HECTOBROCHA PENTACYMA, Meyr.

P.L.S.N.S.W. (2), p. 707, 1886: *H. multilinea*, Lucas, *op. cit.* (2), iv. 1072, 1890.

Specimens of *H. multilinea* sent to me from Brisbane agree so well with the description of *pentacyma* that I have no hesitation in placing them together. Meyrick's species was founded on a single specimen.

CULAMA CALIGINOSA, Walk.

Cossus caliginosus, Walk. M. Cat. 1522, 1856: *C. rhytiphorus*, Lower, Trans. Roy. Soc. S.A. p. 147, 1893.

ONCOPTERA INTRICATA, Walk.

Oncopera intricata, Walk., Bomb. 1559: *Oncoptera intricata*, Meyr., P.L.S.N.S.W. (2), iv. 1124, 1889.

An additional synonym is *Hepialus fusciculatus*, Walk., Char. Und. Lep. Het. p. 68, 1869.

ÆNOSANDRA BOISDUVALII, Newm.

Ænosandra Boisduvalii, Newm., Trans. Ent. Soc. Lond. (2), iii. p. 286, April, 1856: *Ænosanda Duponchelii*, Walk., l.c. p. 1713, May, 1856: *Teara* (?) *luctipennis*, Walk., Char. Und. Lep. Het. p. 66, 1869.

Newman calls the genus *Ænosandra*, and Walker *Ænosanda*. I adopt the former.

DARALA VARIA, Walk.

B.M. Cat. iv. 890, 1855: ♀. *Colussa odenestaria*, Walk., l.c. xxi. p. 288, 1860: *Darala succinea*, Lucas, P.L.S.N.S.W. (2), vi. 290, 1891: *Opsirhina tintinnarra*, Tepper, Comm. Native Ins. S.A. p. 29, 1890.

MICRODES SQUAMULATA, Gn.

x. 298: *Oesymna stipataria*, Walk., Char. Und. Lep. Het. p. 80, 1869.

MONOCTENIA VINARIA, Gn.

Cenochroma vinaria, Gn. ix. 185, pl. vii. 2 : *Balliace vetustaria*, Walk., 290.

An additional synonym is *Monoctenia decora*, Walk., Char. Und. Lep. Het. p. 76, 1869.

EUCHLORIS (IODIS) CITRO-LIMBARIA, Gn.

Chlorochroma citro-limbaria, Gn. ix. 366 : *Iodis Illidgei*, Lucas, P.L.S.N.S.W. (2), iv. 603, 1889.

EUCHLORIS (IODIS) METASPILA, Walk.

Comibæna metaspila, Walk., 580 : *Iodis eucalypti*, Lucas, P.L.S.N.S.W. (2), iii. p. 1267, 1888.

EUCHLORIS (IODIS) SUBALPINA, Lucas.

P.L.S.N.S.W. (2), iii. p. 1264, 1888.

This is I believe identical with *vertumnaria*, Gn.

PHALLARIA OPHIUSARIA, Gn.

An additional synonym is *Smerinthus* (?) *Wayii*, Tepper, Trans. Roy. Soc. S.A., v. 29, 1882. Kirby refers it to *Colussa*.

SELIDOSEMA SILICARIA, Gr.

An additional synonym is *Tephrosia scitiferata*, Walk., Ch. Und. Lep. Het. p. 77, 1869.

DIASTICTIS AUSTRALIARIA, Gn.

An additional synonym is *Macaria comptata*, Walk., Ch. Und. Lep. Het. p. 78, 1869.

SELIDOSEMA EXCURSARIA, Gn.

An additional synonym is *Tephrosia fulgurigera*, Walk., Ch. Und. Lep. Het. p. 77, 1869.

METROCAMPA BIPLAGA, Walk.

Azelina biplaga, Walk., Char. Und. Lep. Het. p. 75, 1869 : *Metrocampa glaucias*, Meyr., P.L.S.N.S.W. (2), vi. 644, 1891.

MNESAMPELA PRIVATA, Gn.

An additional synonym is *Azelina inordinata*, Walk., Ch. Und. Lep. Het. p. 75, 1869.

EPIPRISTIS MINIMARIA, Gn.

Hypochroma minimaria, Gn., Phal. i. 279, 443, 1857: *H. parvula*, Walk., B.M. Cat. xxi. 435, 1860: *Epipristis oxycyma*, Meyr., P.L.S.N.S.W. (2), ii. 916, 1887.

HYPOCHROMA NYSSIATA, Feld.

The insect figured in Reise Nov. Pl. cxxv. 3, is I believe identical with *Scæoptera marginalis*, Walk., one of the *Liparidæ*, although the genus does not appear in Kirby's Catalogue of the *Bombycina*.

CHLENIAS OCHROSOMA, Feld.

The species figured in Reise Nov. Pl. cxxxi. fig. 30, appears to be identical with Guenée's *Stathmorrhopa beggaria*, the variety with ochreous-lined neuration of forewings.

GRAMMODES OCELLATA, Tepp.

Common Native Ins. S.A. p. 46, 1890: *G. excellens*, Lucas, P.L.S.N.S.W. (2) vii. p. 257, 1892; *G. cyanopa*, Meyr. (MSS.).

OPHYX OCHROPTERA, Gn.

Noct. ii. 236, pl. 32, fig. i: *Thermesia tenebrica*, Lucas, Proc. Roy. Soc. Queensland, viii. p. 89, 1892.

STERICTA HABITALIS, Gn.

An additional synonym is *Acrobasis subcultella*, Walk., Ch. Und. Lep. Het p. 81, 1869.

SEMIOCEROS MURCALIS, Walk.

An additional synonym is *Samea distractalis*, Walk., Ch. Und. Lep. Het. p. 73, 1869.

MECYNÀ POLYGONALIS, Hb.

An additional synonym is *Tryphæna tineiformis*, Tepp., Trans. Roy. Soc. S.A. v. 31, 1882.

NOMOPHILA NOCTUELLA, Schif.

An additional synonym is *Stenopteryx corticalis*, Walk., Ch. Und. Lep. Het. p. 73, 1869.

CAPUA OBFUSCATANA, Meyr.

P.L.S.N.S.W. vi. 455, 1881: an earlier name for this species is *intractana*, Walk., (*Sperchia intractana*) Char. Und. Lep. Het. p. 82, 1869.

CACÆCIA POSTVITTANA, Walk.

An additional synonym is *Dichelia vicariana*, Walk., Ch. Und. Lep. Het. p. 82, 1869.

EULECHRIA BRACHYPEPLA, Meyr.

P.L.S.N.S.W. vii. 524, 1882: *Zonopetala* (?) *stenoptera*, Lower, Trans. Roy. Soc. S.A. p. 178, 1893.

GLYPHIPTERYX CYANOCHALCA, Meyr.

P.L.S.N.S.W. vii. 185, 1882: *G. Lyelliana*, Lower, Trans. Roy. Soc. S.A. 182, 1893.

BLABOPHANES MELIORELLA, Walk.

An additional synonym is *Tinea niveibractella*, Walk., Ch. Und. Lep. Het. p. 84, 1869.

Addenda :—

TEARA RUPTIMACULA, Feld.

Ochrogaster ruptimacula, Reis. Nov. t. 95, f. 9, 1874.

This I believe to be identical with *Teara interrupta*, Walk., B.M. Cat. 850, 1855.

DEILEPHILA LIVORNICOIDES, Lucas.

Proc. Roy. Soc. Queensland, viii. p. 73, 1892.

This is simply a geographical form of the European *livornica*, Esp. I have taken specimens of this species at Adelaide, S.A., Moe, Victoria, and Broken Hill, N.S.W., and there is a variation in each and every specimen, but not sufficient to warrant a new species being formed. Lucas's types were from Queensland. I have seen a specimen bred at Adelaide from larvæ feeding on Lucerne (*Medicago*).

STUDIES IN AUSTRALIAN ENTOMOLOGY.

No. VIII.—DESCRIPTIONS OF TWO NEW TIGER BEETLES.

By THOMAS G. SLOANE.

MEGACEPHALA SPENCERI, n.sp.

Robust, oval, cylindrical. Elytra with a submarginal row of widely placed punctures on each elytron. Upper surface metallic; elytra violaceous, inflexed margin piceous-black; prothorax black in middle of upper surface (some green intermingled with the black on the disc), sides purple shading to green on sides of disc; head green, becoming black on middle of occiput and vertex; labrum piceous-brown; mandibles testaceous, inner margin and apex piceous; gulæ purple; mentum piceous; prosternum bluish; episterna greenish; sides of body greenish, tending to blue on mesosternal episterna; mesosternum, metasternum and posterior trochanters piceous; ventral segments black in middle, three basal segments green laterally, fourth with a slight greenish tinge towards sides, fifth black, apical segment black at base and testaceous at apex; legs, palpi and antennæ pale testaceous; trochanters light brown.

Head large, wider across eyes than prothorax, wide between eyes, lightly longitudinally wrinkled near eyes; clypeal suture distinct; eyes large, prominent, hemispherical. Prothorax convex, a little broader than long (5×5.5 mm.), widest about middle, a little narrowed to base; anterior margin lightly sinuate on each side; sides lightly rounded; base sinuate (the middle roundly produced backwards), bordered on each side at basal angles, these rounded; median line well marked between anterior and posterior transverse impressions; anterior transverse impressions sinuate, very strongly impressed on each side, strongly marked and arcuate in middle; posterior transverse impression very strongly impressed.

Elytra oval (12×7 mm.), convex, widest behind middle, widely rounded at apex; whole surface punctate; punctures small but deeply impressed on basal half, becoming more and more minute towards apex (obsolete at apex itself); three large punctures in a row on each side of suture, near base; a row of seven or eight rather strong widely placed punctures about one and one-half millimetre from suture extending to about apical third; two well marked small punctures in a line on apical third behind and a little more distant from suture than the row of seven or eight; a submarginal row of widely and unevenly placed punctures extending from shoulders to apex, a row of closely placed fine punctures along margin of sides. Length 21, breadth 7 mm.

Hab.—Murchison River, West Australia (Coll. French).

This handsome species is allied to *M. cylindrica*, MacL., but differs by its broader and less cylindrical shape, by the absence of the foveiform puncturation on the basal part of the elytra, &c. The elytra are wholly of a metallic blue colour with purple reflections in changing light; the puncturation is close and without order; the punctures are small and impressed in the smooth surface of the elytra (there being no raised interstices or rugosity on any part); they are coarser towards the suture than towards the sides and become very small a little before the middle; behind the apical third they can only be seen with a lens and at the apex itself become obsolete.

TETRACHA EXCISILATERA n.sp.

♀. Robust, oval, convex. Elytra widely oval, coarsely punctate on basal half of disc; a subsutural row of widely placed punctures on each elytron; inflexed margin with a strong short emargination opposite third ventral segment. Head green, becoming black in middle of upper surface; mentum brown; prothorax (including under surface) green, becoming black along middle of upper surface; elytra piceous-black tinged with green on punctate basal part, a yellow margin from humeral angles to apex, this margin triangularly dilatate and reaching about half way to suture at anterior third; legs, antennae, palpi, labrum, and mandibles (excepting apex) pale testaceous; edge of labrum, teeth

of mandibles, upper side of joints 2-4 of antennæ and apex of posterior femora infusate; subsutural row of punctures green at bottom; sides of body and of first three ventral segments green; apical ventral segment and sides of fourth and fifth testaceous.

Head large, feebly bifoveolate between eyes. Prothorax broader than long (3.3×4 mm.), widest at anterior transverse impression, a little narrowed to base, convex between anterior and posterior transverse impressions; these impressions strongly marked; anterior margin deeply and widely sinuate on each side. Elytra much wider than prothorax (8.5×6.2 mm.), rounded on sides, narrowed to base, very widely and obtusely rounded at apex; each elytron widely subdepressed posteriorly on lateral parts of disc; punctate basal part oval, not extending along suture as far as middle of length; the dilatation of the lateral yellow margin hardly punctate; all the elytra behind this dilatation lævigata, subopaque; a row of widely placed fine punctures along margin; marginal channel punctate and greenish-black for a short distance behind shoulders; lateral border lightly arcuate at notch in inflexed margin. Length 12-14, length 5.5-6.2 mm.

Hab.—Barrow Creek, Northern Territory of South Australia (Overland Telegraph Line).

Closely allied to *T. basalis*, MacI., but differing by the elytra having the yellow marginal portion much less widely dilatate behind the shoulders, the punctate basal area smaller (the puncturation near the base not extending to the posterior part of the posthumeral dilatation of the yellow margin as it does in *T. basalis*), the lateral channel with a dark blue reflection behind shoulders, the inflexed margin with a deep emargination opposite third ventral segment, the apical ventral segment alone wholly testaceous (the fourth and fifth being testaceous only near the margins).

Sent to me by Mr. C. French, Government Entomologist for Victoria, as coming from Barrow Creek. I have compared specimens with *T. basalis*, MacI., and found the differences indicated above, which seem to me of specific value.

NEW SOUTH WALES FUNGI.

By D. McALPINE.

(Communicated by J. H. Maiden, F.L.S.)

(Plates I.-II.)

The following ten species of New South Wales Fungi have been forwarded to me during 1896 by Mr. J. H. Maiden, Government Botanist. Of these six are new to science, three recorded for the first time from New South Wales and one on a new host from a new locality. They are thus classified :—

Group—UREDINES, Brongn.

Order—UREDINACEÆ, Brongn.

1. *ÆCIDIUM EBURNEUM*, McAlp.

Group—PYRENOMYCETES, Fries.

Order—PERISPORIACEÆ, Fries.

2. *ASTERELLA HAKEÆ*, n.sp.
3. *ASTERIDIELLA SOLANI*, n.sp.

Group—HYPHOMYCETES, Mart.

Order—DEMATIACEÆ, Fries.

4. *HETEROBOTRYS PARADOXA*, Sacc.
5. *HELMINTHOSPORIUM CONSPICUUM*, n.sp.
6. *FUMAGO VAGANS*, Pers.

Order—TUBERCULARIACEÆ, Ehrh.

7. *BACTRIDIUM VERSICOLOR*, n.sp.

Group—SPHAEROPSIDES, Lev.

Order—SPHAERIOIDACEÆ, Sacc.

8. *PHYLLOSTICTA SORIFORMIS*, Cooke & MASS.
9. *SEPTORIA DIOSPYRI*, n.sp.

Group—USTILAGINES, Tul.

Order—USTILAGINACEÆ, Tul.

10. *USTILAGO CRYPTA*, n.sp.

1. *ÆCIDIUM EBURNEUM*, McAlp.

On legumes of *Bossiaea heterophylla*, Vent.; September 1896; National Park, near Sydney (Maiden).

This species has already been described on *Bossiaea cinerea*, R.Br., from Tasmania and Victoria (Proc. Roy. Soc. Vic. vii. N.S. 21, 1894), but is new for New South Wales. It was also found on legumes of *Bossiaea rhombifolia*, Sieber, sent from Richmond, N.S.W., in November by Mr. Musson.

2. *ASTERELLA HAKEÆ*, n.sp.

(Plate i. figs. 1-3.)

Forming black, soot-like patches on both surfaces of leaves, distinct or confluent, variable in size and shape, somewhat orbicular, commonly $\frac{1}{4}$ inch, but may unite into much larger masses. *Hyphæ* dark brown, thick-walled, septate, nodulose, branched, branches upright and rigid, $7\frac{1}{2}\mu$ broad. *Perithecia* depressed-globose, dark brown, rough, with a few adherent fibrils, 200-380 μ diameter. *Asci* clavate-obovate, subsessile, apex rounded, 8-spored, $35-40 \times 22-24\mu$. *Sporidia* at first colourless, then green, finally brown, 2-3 rowed, elliptic, uniseptate, slightly constricted, upper division usually slightly broader than lower, $22 \times 9\mu$.

On leaves of *Hakea dactyloides*, Cav.; September; National Park, near Sydney (Maiden).

With potassium-iodide-iodine solution the protoplasm of the ascus before the spores are formed and even up to the time when they assume the brown colour, is coloured bright yellow, while the rest of the contents is of a pale bluish tint. The sub-hymenial tissue is also coloured yellow, but the accompanying material is all pale blue.

It approaches *A. Baileyi*, Berk. & Br., but there the patches are reddish-brown and the sporidia are 37μ long.

The old genus *Asterina* is now split up into several, according to the septation and colouration of the sporidia, but by those who

object to spore-characters being considered of generic value, they are regarded as subgenera. I have followed the system adopted by Saccardo in his well-known "Sylloge Fungorum," also in his latest publication just received, "I Prevedibili Funghi Futuri secondo la legge d' analogia" (1896).

Asterula, Sacc., has continuous hyaline spores (Hyalosporæ).
Asteronia, Sacc., has continuous brown spores (Phaeosporæ).
Asterina, Lev., has two-celled hyaline spores (Hyalodidymæ).
Asterella, Sacc., has two-celled brown spores (Phaeodidymæ).
Asteridium, Sacc., has multi-septate hyaline spores (Hyalophragmiæ). And in the case of the specimen on *Solanum viride* with multi-septate brown spores, I have ventured to use *Asteridiella* (Phaeophragmiæ).

3. ASTERIDIELLA SOLANI, n.sp.

(Plate i. figs. 4-9).

On upper and under surfaces of leaves, leaf-stalks and branches; forming densely crowded, minute, black, generally orbicular, often confluent, easily detachable, brittle crusts, with surface of leaf beneath of a pale brown or pale reddish colour. Mycelium composed of an interosculating network of delicate, colourless, septate, luxuriantly branched hyphæ, about $3\ \mu$ broad, and attached to matrix, gradually passing into the stouter coloured hyphæ above it. Coloured hyphæ dark brown, rigid, thick-walled, closely interwoven, septate, branched, $8-9\frac{1}{2}\ \mu$ broad, ultimate branchlets generally 1-septate, knobbed and paler in colour. *Perithecia* seated on crust in clusters, depressedly globose, black, rough with warty spines, $130-330\ \mu$, the latter being the average full-grown size. *Asci* oblong to cylindrical, 4-spored usually, $38-64 \times 13-26\ \mu$ (immature). *Sporidia* brown, oblong, 4-septate, slightly constricted at septa, rounded at both ends, $36-44 \times 14-15\ \mu$. *Pycnidia* globose, golden-brown, opening by circular mouth and wall composed of small polygonal cells $100-140\ \mu$, along with perithecia. *Sporules* minute, subglobose or oval, hyaline or rarely brownish; $5\frac{1}{2} \times 3\ \mu$ or $4\ \mu$ diameter borne, on delicate hyaline, septate, branched hyphæ.

On *Solanum viride*, R.Br.; Tintenbar, N.S.W. (Maiden).

The crusted mycelium is readily removed, and is steel-grey on the attached surface.

The asci when ripe seem to burst within the perithecium, hence the difficulty of getting a mature ascus. The sporidia, which are at first colourless, then greenish and finally brown, often germinate even within the perithecium either from one or more segments. They are stained greenish-yellow by potassium-iodide-iodine, and the other contents of the perithecia are similarly stained.

Helminthosporium solani, McAlp., was the name given to this species in the Agricultural Gazette of New South Wales, Vol. vi. Part 12, p. 855 (1895), from a somewhat imperfect specimen, no perithecia being observed, but a few detached worm-like spores.

On the leaves of *Diospyros caryillia*, F.v.M., three different fungi were found in July, viz., *Heterobotrys paradoxa* (?), Sacc., *Fumago vagans*, Pers., and *Septoria diospyri*, n.sp. *Fumago* and *Heterobotrys* are what are called form-genera, from being simply stages in the life-cycle of higher fungi, but until these higher stages are found, it will be convenient to record them.

4. *HETEROBOTRYS PARADOXA*, (?) Sacc.

On upper surface of leaf, forming minute black specks, scattered all over. *Hyphæ* pale green, septate, and usually slightly constricted at septa, branched, $5\frac{1}{2}\mu$ broad.

The irregularly shaped perithecium-like bodies consist of a parietal portion composed of small brown mulberry-like clusters, each cell about 4μ in diameter, and a central portion of hyaline spherical cells, either isolated or united in chains, $7-11\mu$ diameter and imbedded in a gelatinous matrix.

This occurs as a stage in *Capnodium citricolum*, McAlp., and has already been recorded in that connection from New South Wales.

5. *HELMINTHOSPORIUM CONSPICUUM*, n.sp.

(Plate i. figs. 10-11.)

Hypophyllous; Effused, sooty-black, velvety, conspicuous patches, roughly orbicular unless at margin of leaf, sometimes about 1 inch in diameter. *Mycelium* composed of green, slender, septate, branched hyphæ, forming a regular pavement next to matrix, and brown, stout, rigid, thick-walled hyphæ imbedded in and arising from the former. *Green hyphæ*, with portions colourless, average 2μ diameter. *Brown hyphæ* creeping, very thick-walled, giving rise to short, club-headed branches, or long gonidiophores, $7\frac{1}{2}\mu$ broad. *Gonidiophores* simple, erect, rigid, brown, straight or wavy, apex rounded and often paler than the rest, up to $\frac{1}{2}$ mm. high and 5μ broad. *Gonidia* clear brown, fusoid or elongated-fusoid, somewhat acute at one or both ends, often tapering towards base, not constricted, usually 3-septate, $24-28 \times 5\frac{1}{2}-6\frac{1}{2}\mu$.

On leaves of unknown plant; New South Wales (Maiden).

This species is quite distinct from any of the recorded Australian ones.

6. *FUMAGO VAGANS*, Pers.

(Plate i. fig. 12.)

On under surface of leaf among the mealy pubescence caused by the numerous short, curved, hyaline hairs. This, which is the gonidial form of a *Capnodium* (*C. salicinum*, Mart.), has not hitherto been recorded for New South Wales.

On leaves of *Diospyros cargillia*, F.v.M.; July; New South Wales (Maiden).

7. *BACTRIDIUM VERSICOLOR*, n.sp.

(Plate ii. figs. 13-14.)

Tubercles closely crowded, globose, hemispherical, black, but passing through fawn, pink and brown when young, firm, about

$\frac{3}{4}$ mm. in diameter. Potassium-iodide-iodine differentiates the basal stratum from the gonidiophores by colouring the former yellow and the latter a beautiful indigo-blue, while the gonidia are coloured a very pale yellow. *Gonidiophores* compact, erect, colourless, septate, rounded at free ends, simple, $130-140 \times 4 \mu$. *Gonidia* hyaline, straight or slightly curved, elongated, linear-clavate, tapering towards attached end and blunt at the other, multiseptate, up to 15-septate, often decidedly constricted at septa, $47-60 \times 3\frac{1}{2}-4\frac{1}{2} \mu$.

On bark of *Tubernaemontana orientalis*, R.Br.; April; Macleay River, N.S.W. (Maiden).

The simple gonidiophores and multiseptate gonidia seem to point to Bactridium rather than Fusarium, but the firm, even hard, tubercles most resemble the latter.

The numerous distinct septa of gonidia (12 being a common number) distinguish this at once from any described species with compact tubercles.

8. PHYLLOSTICTA SORIFORMIS, Cooke & Mass.

(Plate ii. figs. 15-17.)

Spots on both surfaces of leaves, orbicular, commonly 2 mm. diameter and up to 5 mm., confluent and then may be $\frac{1}{2}$ inch or more and sometimes entire surface of leaf is more or less a continuous mass, pale reddish-brown without distinct margin, and sometimes entirely covered by the minute, black, densely aggregated, prominent perithecia. *Mycelium* composed of pale green, creeping, septate, much-branched anastomosing hyphæ, 4-5 μ broad and producing two kinds of reproductive bodies. (a) *Gonidia* laterally and terminally at the ends of branches, brown, cylindrical, rounded at the ends, triseptate, slightly constricted at septa, Helminthosporium-like, $17-20 \times 5\frac{1}{2}-7\frac{1}{2} \mu$. (b) *Perithecia* punctiform, run together, arranged like sori of uredines, subcuticular and bursting through cuticle. *Sporules* rod-like, hyaline, $4 \times 1 \mu$.

On leaves of *Persoonia salicina*, Pers., and *P. lanceolata*, Andr., May-September; National Park, near Sydney (Maiden).

9. SEPTORIA DIOSPYRI, n.sp.

(Plate ii. fig. 18.)

Perithecia epiphyllous, minute, membranaceous, brownish, with a few (about 6) dark brown, flexuous, rigid, septate, sharply pointed appendages, associated with *Heterobotrys paradoxa*, Sacc. *sporules* hyaline, filiform, curved, slender, 5-septate, $40-45 \times 1-1\frac{1}{2} \mu$.

On upper surface of leaf of *Diospyros cargillia*, F.v.M.; July; New South Wales (Maiden).

10. USTILAGO CRYPTA, n.sp.

(Plate ii. fig. 19.)

Forming black masses within the flowering-glumes which wither up and still envelop the spore-masses. Resting-spores globose or slightly elliptic, yellow to yellowish-brown, epispore smooth, dark-brown, thickish, $8-10 \mu$ diameter or $8\frac{1}{2} \times 5\frac{1}{2} \mu$.

On *Panicum bicolor*, R.Br.; New South Wales (Maiden).

It differs from *U. confusa*, Mass., in the non-pulverulent, not naked spore-masses; and from *U. panici-miliacei* in the smaller and narrower spores.

EXPLANATION OF FIGURES.

All the figures, unless otherwise stated, are magnified 1000 diameters.

PLATE I.

Asterella hakee.

Fig. 1.—Ascus with sporidia of a clear brown colour.

Fig. 2.—Asci in which the shaded portions are stained with KI-I.

Fig. 3.—Brown sporidium.

Asteridiella solani.

Fig. 4.—Immature asci ($\times 540$); *b*, probably mature.

Fig. 5.—Immature ascus treated with KI-I.

Fig. 6.—Sporidia, some of which are producing germ-tubes.

Fig. 7.—Surface view of pycnidium ($\times 145$).

Fig. 8.—Colourless filament inside pycnidium producing sporules.

Fig. 9.—Sporules.

Helminthosporium conspicuum.

Fig. 10.—Free ends of gonidiophores with immature gonidia.

Fig. 11.—Gonidia.

Fumago vagans.

Fig. 12.—Hyphæ with gonidia.

PLATE II.

Bactridium versicolor.

Fig. 13.—Terminal end of gonidiophore.

Fig. 14.—Gonidia.

Phyllosticta soriformis.

Fig. 15.—Gonidia produced laterally and terminally.

Fig. 16.—Section of leaf showing epidermal cells and perithecia on surface
($\times 145$).

Fig. 17.—Sporules ($\times 600$).

Septoria diospyri.

Fig. 18.—Sporule.

Ustilago crypta.

Fig. 19.—Resting-spores.

NOTES AND EXHIBITS.

(With the exception of the last one, the following exhibits were unavoidably held over from the last Meeting.)

Mr. Fletcher exhibited two moths (*Chrysiphona occultans*, Don.) bred from caterpillars forwarded by Mr. A. Simson of Launceston, because of their striking resemblance to the leaves of the sprouting shoots of *Eucalyptus amygdalina*, on which they were found to be feeding.

Also, for Mr. C. T. Musson, a specimen of a day-flying moth (*Agarista Macleayi*), one of a number whose stridulating powers attracted attention on the 9th Nov., at the Kurrajong Heights. Though known to Mr. Masters as a sound-producer, there would appear to be no previous recorder of it in this capacity, nor is it included among the stridulating species of Australian lepidoptera mentioned by Messrs. H. Edwards, H. Tryon and G. F. Hampson. Also a specimen of a plant, *Bossicea rhombifolia*, Sieb., infested with a fungus, *Aecidium eburneum*, McAlp., unrecorded from New South Wales. Also specimens of a beetle (*Rhopæa soror* or an allied species) which appeared in prodigious numbers in the paddocks of the Hawkesbury Agricultural College at Richmond, during the last two or three weeks of November. At night time they were distinctly audible at some distance. Large numbers came into the houses, attracted by the light. With them were associated a few specimens of *Anoplognathus*. Many of the specimens of *Rhopæa* were noticed to be infested with a spider mite, doubtless a species of *Gamasus*.

Mr. Trebeck exhibited a specimen of a fish, *Solenognathus spinosissimus*, from Middle Harbour.

WEDNESDAY, APRIL 28TH, 1897.

The Ordinary Monthly Meeting of the Society was held at the Linnean Hall, Ithaca Road, Elizabeth Bay, on Wednesday evening, April 28th, 1897.

Professor J. T. Wilson, M.B., President, in the Chair.

Messrs. H. H. Edwards, Perth, W.A.; W. Forsyth, Centennial Park, Sydney; G. A. Waterhouse, Waverley; and A. J. Haynes, Darlinghurst, were elected Members of the Society.

The President brought under the notice of the Meeting a circular letter from the President of the Royal Society of London, giving particulars of the Victoria Research Fund which it is proposed to establish in commemoration of the present 60th year of the reign of Her Gracious Majesty the Queen, the income of the Fund to be applied to the advancement of science in all parts of the British Empire.

DONATIONS.

Zoologischer Anzeiger. xx. Band. Nos. 524-525. (Feb.-March, 1897). *From the Editor.*

Pharmaceutical Journal of Australasia. Vol. x. No. 3. (March, 1897). *From the Editor.*

Natural History Society of New Brunswick—Bulletin. No. xiv. (1896). *From the Society.*

College of Science, Imperial University, Japan—Journal Vol. ix. Part 2 (1897). *From the Director.*

Société Royale Linnéenne de Bruxelles—Bulletin xxii.^{me} Année, No. 5 (Fév. 1897). *From the Society.*

U.S. Geological Survey—Sixteenth Annual Report (1894-95).
Part 1. *From the Director.*

Johns Hopkins University—Memoirs from the Biological Laboratory. Vols. ii-iii. (1893-95): Hospital Bulletin. Vol. viii. No. 72 (March, 1897). *From the University.*

American Philosophical Society, Philadelphia—Proceedings. Vol. xxxv. No. 151 (1896). *From the Society.*

Academy of Natural Sciences, Philadelphia—Proceedings, 1896. Part ii. *From the Academy.*

American Academy of Arts and Sciences, Boston—Proceedings. n.s. Vol. xxiii. (1895-96). *From the Academy.*

Cincinnati Society of Natural History—Journal. Vol. xix. No. 1. *From the Society.*

K. K. naturhistorisches Hofmuseum, Wien—Annalen. Band x. Nr. 3-4. *From the Director.*

Gesellschaft für Erdkunde zu Berlin—Verhandlungen. xxiii. Band. (1896), No. 6; Zeitschrift. xxxi. Band. No. 3. *From the Society.*

Verein für vaterländische Naturkunde in Württemberg—Jahreshefte. lii. Jahrgang (1896). *From the Society.*

L'Académie Impériale des Sciences de St. Pétersbourg—Mémoires. viii^e. Série. Vol. ii. 1^{er}-2^{me} Fasc.; iii. 2^{me} Fasc.; iv. 1^{er} Fasc. *From the Academy.*

Muséum d'Histoire Naturelle de Paris—Bulletin, 1896. No. 7: Nouvelles Archives. iii^{me} Série. T. viii. 1-2. *From the Museum.*

Journal de Conchyliologie. 3 Série. T. xxxv. (1895). *From the Editor.*

Société des Sciences Naturelles de l'Ouest de la France—Bulletin. T. vi. (1896) 3^{me} Trimestre. *From the Society.*

Royal Society of Queensland—Proceedings. Vol. xii. (1896). *From the Society.*

Royal Microscopical Society—Journal, 1897. Part i. *From the Society.*

Hooker's "Icones Plantarum." Fourth Series. Vol. vi. Part i. (Feb., 1897). *From the Bentham Trustees.*

Madras Government Museum—Bulletin. Vol. ii. No. i. *From the Superintendent.*

Bureau of Agriculture, Perth, W.A.—Journal. Vol. iv. No. 6 (March 24th, 1897). *From the Secretary.*

Victorian Naturalist. Vol. xiii. No. 12 (March-April, 1897). *From the Field Naturalists' Club of Victoria.*

Agricultural Gazette of N.S.W. Vol. viii. Part 3 (March, 1897). *From the Hon. the Minister for Mines and Agriculture.*

University of Melbourne—Exam. Papers: Final Honour, Degrees, &c. (Feb., 1897). *From the University.*

"The Surveyor," Sydney. Vol. x. No. 4 (April, 1897). *From the Editor.*

Perak Government Gazette. Vol. x. Nos. 6-7 (March, 1897). *From the Government Secretary.*

Oxford University Museum—Catalogue of Books added to the Radcliffe Library during 1896. *From the Librarian.*

Société Royale des Sciences, &c., de Liège—Mémoires. 2^{me} Série. T. xix. *From the Society.*

Auckland Institute and Museum—Report for 1896-97. *From the Curator.*

Geological Survey of India—Memoirs. Vols. xxv.-xxvi. (1895-96): Records. Vol. xxx. Part i. *From the Director.*

Australasian Journal of Pharmacy. Vol. x. No. 136 (April, 1897). *From the Editor.*

American Naturalist. Vol. xxxi. (1897) No. 363 (March). *From the Editor.*

American Museum Nat. Hist., N.Y.—Bulletin. Vol. ix. Articles 1-6, (pp. 1-110). *From the Museum.*

Société d'Horticulture du Doubs—Bulletin. Sér. illust. No. 15 (Mars, 1897). *From the Society.*

Société Royale de Géographie d'Anvers—Bulletin. T. xxi. 1^{er} Fasc. (1897). *From the Society.*

ON THE FERTILISATION OF *EUPOMATIA*
LAURINA, R.Br.

BY ALEX. G. HAMILTON.

(Plate III.)

This remarkable plant flowered plentifully in December, 1896, and I was able to make a series of observations upon it. The results fully support Robert Brown's hypothesis as to the method of fertilisation. He speaks of it in the following words:—"A singular part of the structure of *Eupomatia laurina* consists in its internal barren petal-like stamens which from their number and disposition completely cut off all communication between the antheræ and stigmata. This communication appears to be restored by certain minute insects eating the petal-like filaments, while the antheriferous stamina, which are either expanded or reflected, and appear to be slightly irritable, remain untouched. . . . I have at least not unfrequently seen the barren stamina removed in this way, and as all the stamina are firmly connected at the base, and fall off together, it is difficult to conceive any other mode of exposing the stigmata to the influence of the antheræ" (1). In another place (2) he speaks of it in almost identical terms.

The late Dr. G. Bennett says:—"The *Eupomatia laurina* is found in woods and thickets about Port Jackson, and is abundant in the Illawarra district about the mountains. It flowers from December to February. The branches are long and drooping with handsome dark green laurel-like foliage, producing small white flowers of most singular structure and delightful fragrance. . . . In December the trees are covered with a profusion of white waxy flowers emitting an odor similar to that of *Magnolia fuscata*. The only insect I observed on the flowers was a small *Curculio* similar to that seen on the *Eupomatia* in Illawarra." In two footnotes he adds:—"Another species has been discovered in Moreton Bay District (Q.) with small but elegant variegated

flowers; it is figured in Sir Wm. Hooker's series of Curtis's Bot. Mag. Vol. 81, Pl. 4848, and Dr. Mueller, the Director of the Botanic Gardens at Melbourne, has done me the honour of naming it *E. Bennetti*. . . . The late Dr. Brown observed a singular part of the structure [Dr. Bennett here quotes the above passage]." In 1834 Dr. Brown requested me to observe in Australia the economy of these flowers, and to ascertain whether his statements were correct, and, if so, what insect is employed in the operation. On my friend Dr. H. visiting Illawarra, I desired him to make the necessary observations, as the *Eupomatia* was abundant in that district, and the only insect he found upon it was a small brown *Curculio*" (3).

In Curtis's "Botanical Magazine" (Vol. 81, t. 4848), *E. Bennetti* is figured and described under the name of *E. laurina*. The text says:—"The flower then, as seen in the figure, consists of a turbinate green receptacle, on the thickened edge of which the numerous stamens are arranged in many series, of which the outer are antheriferous, consisting of a broad subulate filament, with a linear cell on each margin, opening longitudinally; all the inner stamens are abortive, large, petaloid, obovate, yellow stained with orange or blood-colour at the base, especially the inner ones, and have exactly the appearance of a many-petalled corolla, of which the outer ones spread so as to cover and conceal the perfect stamens, while the inner ones are connivent, and almost conceal the ovaries. The outer of these petaloid stamens have the disc beset with conspicuous, stipitate globose glands, and the margin with stellated hairs, while the rest have both on the disc and the margin, stipitate glands. In Mr. Brown's plant, the petaloid abortive stamens are small and connivent, much shorter than the spreading fertile stamens, and destitute of the remarkable glands and stellated hairs" (4).

These are the only references I have been able to find to the peculiar structure of the flower, apart from descriptions in Fl. Aust. and Fr. Phy. It is figured in the Atlas to Brown's Botany of Terra Australis, t. 2, but I have not seen the figure.

The plant is a small tree growing plentifully near water-courses in Illawarra. The branches are long, thin and curved; the leaves light (not dark, as described by Brown) green with a varnished surface, oblong lanceolate in shape and recurving at the margins for a short distance above the petiole (figs. 11 and 12); sometimes in leaves on young shoots from a felled tree, the fold forms a tooth (fig. 13). They resemble folds described as *Domatia* by Dr. Lundström in the oak and other plants, but I have not observed *Acarids* in them. "Sepals and petals completely consolidated into one mass, the upper part falling off in a conical lid, leaving the lower campanulate tube (or enlarged peduncle), filled with the thick flat-topped torus" (Bentham, *Fl. Aust. i.* p. 54). The stamens are of two kinds:—(1) The inner barren staminodia, broad, flat, and waxy, and described as greenish-yellow, but I have never seen them any other than ivory-colour. On the margins, in one or two instances, I have observed microscopic stellate hairs similar to those figured in the Botanical Magazine on *E. Bennettii*, but much smaller. These staminodes are in several rows, the inner rows leaning over the centre of the flower and entirely cutting off all access to it, the outer rows standing up all round (fig. 3, *s*). Outside of these is—(2) A row of fertile stamens, which in the bud are closely pressed together over the staminodia (fig. 2); but when the flower opens they gradually reflex till they reach a pendent position (fig. 3, *a*). The base of the filament is wide, thin, and concave, and when the open flower is touched, they move in a manner suggestive of irritability, as Brown pointed out, but I am certain that they are not sensitive in this way. The pollen grains are usually like a double-concave lens, but take other irregular shapes also (figs. 5 and 6). The carpels are many, and are inserted in the fleshy torus (fig. 8). The stigmas are sessile on the disc. When the flower opens, the whole of the disc and stigmas are moist, and I have not been able to make out whether they are then ready for pollination or not, but from the short time that the flower lasts, I imagine that they are in a fit state when it opens. The fruit is several-celled, formed of the enlarged calyx-tube, usually broadly turbinate, and about $\frac{3}{4}$ of an inch in

diameter. When ripe it is soft and purplish-red (fig. 7). The flowers are solitary in the axils, but frequently grow out from the trunk of the tree, a characteristic that belongs to others of the same natural order, as Wallace says of a *Polyalthia* in Borneo, that the slender trunk was completely garlanded with star-shaped flowers (5). *Ficus aspera* and *Castanospermum australe* have the same habit, which Wallace thinks belongs for the most part to tropical trees.

The flower opens in the early morning, and closes about 5.30 p.m. on the same day, the ring of staminodia and stamens dropping off entire the same night or early next day. These fallen flowers are very peculiar in appearance, quite unlike any blossom I have ever seen before. They resemble small sea-anemones more than anything else I can think of, and have a general uncanny appearance. The thin expanded bases of the filaments cause the stamens to tremble and wriggle in a way very suggestive of animal life. They have a very strong rich penetrating scent with reminiscences of other odours. Sometimes, as Bennett says above, it was like *Magnolia fuscata*, then one got a whiff of decaying pine-apple, and at times there seemed to be an intermingling of stale fish. A single flower in a room was quite sufficient to fill it with the perfume, and after handling the flowers, the smell clung persistently to the fingers. In previous years I had found stray blossoms at various dates from November to February, but in 1896 all the plants I could find flowered from the 18th to the 25th December, and after the latter date I could not find a single flower.

Having read what Brown and Bennett wrote about the insects frequenting the blossoms, I watched a tree near my residence for some time before it flowered, and specially searched for the Curculios, but could find none. On the 18th December I found two flowers open, but for a moment did not recognise them as flowers, as they were covered with a crawling mass of beetles. Yet the evening before I had examined the tree closely (it is a shrub of about eight feet in height) without discovering a single insect. When the branches were jarred, the beetles dropped off the flowers to the ground. Later in the day I again examined

the two flowers, and found that the beetles had eaten holes in many of the staminodia, and had penetrated to the heart of the flowers. On the discs rested a mass of débris, excrement and pollen-grains. The outer fertile stamens were untouched. The edges of the stamens and staminodes were turning a rusty brown. Next morning I found the two rings of stamens and staminodes beneath the tree, now rusty-coloured all over, as if decaying, but still emitting the characteristic scent. On this day—the 19th—no flowers were open, and again a careful search failed to reveal beetles anywhere on the plant. On the 20th December four flowers were open and covered with the insects; and on removing the central staminodes, I found several had penetrated to the disc. On the 21st almost every flower was open—some hundreds in number—and in every one I examined, the beetles were present on the outside, or within the staminodes—very often in both positions. As the day wore on, almost all of them disappeared, having made their way into the closed interiors. On visiting the tree at 9 p.m. I found that in almost all the flowers the fertile stamens had moved up to the bud position (fig. 2) covering the staminodes (which had also closed into the early position) closely. They were almost empty of pollen. In the morning almost all the previous day's flowers had dropped, and in these, as well as in the few which remained in place, the stamens were again in the reflexed condition and very limp, and the staminodes in the open position, but still cutting off access to the disc. One flower which I had protected from beetles before the operculum dropped was still open and in its place; on shaking it a cloud of pollen flew out of the stamens. The dropped blossoms on the ground were swarming with beetles, but there were none on the discs of the flowers which had lost their stamens. Microscopic examination of some of the insects showed that the tarsi, antennae, and the hairs with which they are covered were dusted with pollen, so that any beetles making their way into the disc of a newly opened flower would be likely to bring about pollination.

Fertilisation appears to be effected by the beetles. These are attracted by the strong scent of the opening flower, and in alight-

ing on it, smear themselves with pollen from the fertile stamens, which at that stage have not reached the pendent position. They then bore into the disc through the staminodes, and continue eating the inner surface, at the same time placing the pollen on the stigmas. Thus it would seem that the first few flowers opening would certainly be self-fertilised. But all opening after the first day would be likely to be cross-fertilised, as the beetles would bring pollen from the flowers previously visited. Almost every flower on two trees which I watched has developed a fruit, a fact not to be wondered at when the large number of beetles visiting the tree is considered.

When I first saw the beetles at work I was inclined to think that this was a case similar to the *Yucca*, in which the *Yucca*-moth stuffs the pollen into the hollow stigmas after depositing their eggs in the ovulary. But by careful observation I made sure that the beetles did not deposit their eggs about the flower, and that when the ring of stamens and staminodes dropped off, the disc was left clear of everything. And in sections since cut of large numbers of fruit, I have never found any larvæ. I am, therefore, quite certain that the process of fertilisation is as I have described it. A remarkable fact is, that notwithstanding the strong scent of some hundreds of blossoms on this tree, which was perceptible 20 yards away, no other insect visited them; although not far away there were hundreds of bees, butterflies, flies and other species of beetles at work on the blossoms of a myrtle bush. It would seem as if the plant deliberately laid itself out to attract the one species only.

The most important question arising out of this extraordinary method of fertilisation is how it could have originated. Here we have a flower so constructed as to cut off pollen from its stigmas completely, unless it is placed there by extraneous means. What were the steps by which the plant developed a large number of sterile stamens adapted—first, to cut off access of its pollen; and, second, to be attractive to beetles as food? And what first caused the beetles to visit the flower and so undo the self-imposed sterility of the plant? To these questions I am unable to offer any reply.

But a careful study of the structure of the stamens and methods of fertilisation in other plants of the Anonaceæ might reveal something of the line of evolution. It is the only plant of the Order with which I am acquainted; but on reading over the descriptions of the species of *Ancana*, *Polyalthia*, and *Melodorum* in Moore and Betche's "Handbook of the Flora of New South Wales," I found that in all these genera the connective of the anther is described as broad and flattened, concealing the cells. Here there may be a clue to the line of development. Might I draw the attention of botanists in Queensland and on our northern rivers to the desirability of observing the fertilisation of *E. Bennetti*? In this species the staminodes do not completely shut the disc up. It would be interesting to know if the same insect is concerned in the fertilisation, or an allied species.

The beetle (Fig. 10) which is to be described as a species of *Elleschodes* by the Rev. T. Blackburn in the next Volume of the Proc. Roy. Soc. of S.A. is one of the Curculionidæ belonging to the group *Elleschides*. It is about 2 mm. in length, and possesses many adaptations to the flower. Thus it is provided with spurs on the inner aspect of the tibiæ of the two front pairs of legs, and a comb-like series of points along the tibiæ where the tarsi are attached. These enable it to cling to the slippery surface of the staminodes and give it a firm hold as it forces its way into the head of the flower. From its hairiness, it is well adapted to carry the pollen from one flower to another and thus to ensure cross-fertilisation.

REFERENCES.

- (1) BROWN, R.—Miscellaneous Botanical Writings, Vol. i. p. 74.
- (2) " " —Botany of Terra Australis, p. 65; Atlas, t. 2.
- (3) BENNETT, Dr. G.—Gatherings of a Naturalist, p. 363.
- (4) CURTIS—Botanical Magazine, Vol. 81, t. 4848.
- (5) WALLACE, A. R.—Tropical Nature, p. 35.

EXPLANATION OF PLATE.

Eupomatia laurina, R.Br.

- Fig. 1.—An unopened bud.
Fig. 2.—Bud after the fall of the cap.
Fig. 3.—The open flower ; α , fertile stamens ; s , staminodes.
Fig. 4.—A stamen.
Fig. 5.—Pollen grains—dry.
Fig. 6.—Pollen grain in clove oil.
Fig. 7.—The fruit.
Fig. 8.—Longitudinal section of fruit.
Fig. 9.—Transverse section of fruit.
Fig. 10.—The beetle (*Elleschodes* sp.).
Figs. 11-13.—Bases of leaves, showing the folds.

DESCRIPTIONS OF THE NESTS AND EGGS OF THREE SPECIES OF AUSTRALIAN BIRDS.

BY ALFRED J. NORTH, C.M.Z.S., ORNITHOLOGIST, AUSTRALIAN
MUSEUM, SYDNEY.

1. *CRACTICUS RUFESCENS*, DeVis.

Rufous Crow-Shrike.

The known range of the Rufous Crow-Shrike extends throughout the coastal scrubs of north-eastern Queensland from the neighbourhood of the Daintree River in the north to the Herbert River in the south. Future research will undoubtedly extend this range both north and south, to all districts of tropical Queensland having a similar flora. Dr. Ramsay first drew attention to this bird at a meeting of the Linnean Society of New South Wales in November, 1877, from specimens obtained by Mr. Kendal Broadbent, near Cairns; but stated that he believed it to be the young of *Cracticus quoyi*. In Volume II. of the Society's Proceedings, Dr. Ramsay fully describes it, and adds the following note:—"The only thing in favour of this bird being a distinct species is the fact that on six different occasions some of our best taxidermists have collected during the whole season in districts in which *C. quoyi* is plentiful, without once having met with any bird in a similar stage of plumage." Subsequently* Mr. De Vis described it as a new species, under the name of *Cracticus rufescens*, from specimens also obtained by Mr. Broadbent in the Tully and Murray River scrubs. It is beautifully figured by Dr. Sharpe in his "Birds of New Guinea"† from examples procured by the late Mr. T. H. Boyer-Bower on the Mulgrave River. Specimens were also obtained by Messrs. Cairn and Grant, who were collecting in the same locality on behalf of the Trustees of the Australian Museum. Mr. Grant

* Proc. Linn. Soc. N.S.W. Vol. vii. p. 562 (1883).

† Gould and Sharpe, Birds of New Guinea, Vol. iii. Pl. 16 (1875-88).

informs me that he usually met with this species in low-lying lands, searching for insects among the fallen leaves in open parts of the scrub. It is somewhat remarkable that during a period of eleven months' collecting in that part of Queensland in 1888-9 he never saw two Rufous Crow-Shrikes in company; it was always one Rufous and one Black Crow-Shrike. I have now two birds before me shot while feeding together in the scrub opposite Double Island. One is *C. rufescens*, the other is *C. quoyi*, and both are sexed as males. Mr. J. A. Boyd, who has resided fifteen years on the Herbert River, sent me two eggs of the former species, taken on the 26th of October from a nest on which the female was sitting, together with the following note:—"Yesterday a black gin brought me a pair of most peculiar eggs belonging to a species of *Cracticus*, which the natives call "Kulgo" from its note. The male is a very noisy black bird about the size of *Eudynamis*, the female brown. There is a great difference between the eggs, though in both the ground colour is very pale green. One is pyriform, with a lot of dark chocolate blotches on the larger end, and a band of green around the middle; the other is oval in form, a few ink-like marks taking the place of the blotches on the larger end, and the band around the middle is absent. The nest, which was built between the trunk and a couple of branches of a small tree overhanging Ripple Creek, was a simple construction of twigs without lining, and showing daylight all through. Both eggs are heavily incubated, and one is broken in two places by the gin's teeth, as she brought them down from the nest in her mouth." The eggs forwarded by Mr. Boyd are as described by him, and are only distinguishable from those of *C. quoyi* by being slightly larger, of a paler green ground colour, and rather more conspicuously marked. The narrow green band around the centre of one egg is purely an accidental marking; I have seen similar bands on the eggs of other species. Length (A) 1.45×1.05 inch; (B) 1.43×1.03 inch.

In a subsequent letter, Mr. Boyd writes:—"Why this *Cracticus* is called *rufescens*, I do not know; certainly the female is reddish-brown, but the male is jet black." Owing to these birds being

by no means common on the Herbert River, Mr. Boyd has been unable to grant my request for a pair shot at the nest. He has, however, forwarded a fledgeling, which was captured by a Kanaka girl on the plantation on the 26th of November, 1895. This specimen is almost similar in the character of its markings to the fully adult *C. rufescens*, but it is darker in colour, and the rufous centres of the feathers on the upper surface are broader and of a deeper tint than in the adult; wings and tail dark brown; all the under surface light rufous, the feathers on the lower neck edged and tipped with blackish-brown; total length 8·5 inches, wing 4·5, tail 2·8, bill 1·4, tarsus 1·5. I have not seen the young of *C. quoyi*, but it is described in the Catalogue of Birds in the British Museum* as being smoky-black. Upon the authority of Mr. Broadbent, and the late Mr. F. H. Boyer-Bower, Mr. De Vis and Dr. Sharpe respectively agree in describing the sexes of *C. rufescens*, as being nearly alike in colour. Why a Rufous and a Black Crow-Shrike should be always seen together, if not a sexual distinction of one species, is a mystery to me, and I look forward to our energetic member, Mr. Boyd, to solve it.†

2. SPHENURA BROADBENTI, McCoy.

Rufous-headed Bristle-bird.

This fine Bristle-bird was discovered in 1858 in a dense scrub about twenty-four miles from Portland Bay, Victoria, by Mr. Kendal Broadbent, who presented a single example of it to the National Museum, Melbourne. It was first described by Sir Frederick McCoy in the Annals and Magazine of Natural History in March, 1867; who named it in honour of its discoverer. Sub-

* Gadow, Cat. Bds. Brit. Mus. Vol. viii. p. 95 (1883).

† Since the above was sent to press, Mr. W. S. Day, who has been collecting in the neighbourhood of Cairns for the past seven years, writes me as follows: "*Cracticus rufescens* is fairly common at Riverstone, sixteen miles inland from Cairns. I have shot a lot of them, but got very few on top of the range. The female is always brown and so is the young male, but the old male is black."

sequently the specimen from which his description was taken was forwarded to England to Mr. Gould, who figured it in his "Supplement to the Birds of Australia." For many years after but few of these birds had been obtained, and in 1883 evidently there was not an example of it in the British Museum when Dr. Sharpe prepared the seventh volume of the Catalogue of Birds, for on page 106 he there transcribes Sir Frederick McCoy's original description and his accompanying note giving the locality where the bird had been procured. By some oversight, however, Dr. Sharpe has erroneously recorded the habitat of this species as the "Interior of South Australia." The Rufous-headed Bristle bird is exclusively confined to the dense scrubs of south-western Victoria, and is probably more abundantly distributed in the ranges and gullies of the Otway Forest than elsewhere. The settlement of portion of this area, and the forming of marine resorts at Loutit and Apollo Bays, has proved that this bird is by no means a rare species, although, like its congeners, it keeps out of sight as much as possible, and its note is more often heard than the bird is seen. Two nests of this species found in the thick undergrowth of gullies in the Otway Forest were oval-shaped structures somewhat loosely put together with an entrance at the side, and were made externally of dried plant-stems, wiry fibrous roots and dried grasses, the inside being almost exclusively lined with rootlets. These nests were found in November, and each contained two fresh eggs. Two eggs now before me are of a dull purplish-white ground colour, one specimen having numerous freckles and spots of purplish-brown evenly distributed over the surface of the shell, and the larger end slightly tinged with slaty-grey; the other is similar in colour, but is more finely and thickly marked, and has a darker cap of confluent markings on the larger end. These eggs are in form slightly swollen ovals, and are very thin-shelled. Length (A) 1.07 x 0.84 inch; (B) 1.09 x 0.85 inch.

In the original description of this species in the Annals and Magazine of Natural History, and which has been transcribed by Mr. Gould in his "Supplement to the Birds of Australia," the length is there given as 7 inches 9 lines. A young female now

before me measures from the tip of the bill to the end of the longest tail feathers 9·9 inches.

3. *DENDROCYGNA EYTONI*, Gould.

Eyton's Tree Duck.

The range of Eyton's Tree Duck extends throughout the Australian colonies, but it is more sparingly distributed in the southern portions of the continent. In Tasmania and New Zealand it is only known as a very rare accidental visitor. After an abundant rainfall it is unusually plentiful on the Barwon, Warrego, and Macquarie Rivers in north-western New South Wales, but it is seldom seen in dry seasons. It is exclusively a fresh-water duck, and is generally met with in the shallow water near the margins of swamps and rivers, except during the breeding season, when it resorts to well grassed country some distance from water. Living chiefly on a vegetable diet, which consists principally of the tender buds of various aquatic plants, and grasses, its flesh is much esteemed as an article of food, and for delicacy of flavour is considered by some to surpass that of any other duck inhabiting Australia. Although vernacularly called Tree Ducks—but more commonly known as Whistling Ducks, from their peculiar sibilant note uttered only while on the wing—it is somewhat remarkable that the two species of *Dendrocygna* found in Australia should both nest on the ground, while all other members of this genus, with the exception of *D. javanica*, of India, resort to hollow limbs of trees, or build nests of sticks, if the deserted tenement of a crow, heron, or other bird is not available. For an opportunity of examining and describing the eggs of Eyton's Tree Duck, I am indebted to an ardent sportsman and oologist, who found these birds breeding near that famous resort of wild fowl, the Macquarie Marshes. While shooting at Buckinguy on the 23rd of September, 1893, in the long cane grass, about one-third of a mile from an anabranch of the Macquarie River, he flushed one of these birds, which he quickly fired at, and it fell. As he moved forward to pick it up, he

almost stepped on the nest which was built at the side of a tussock of cane grass. It was a slight hollow in the soil, lined only with short pieces of cane grass, and contained nine fresh eggs. Evidently the ducks had just begun to lay, for although twelve of them were obtained, only one more nest was found that day, which was similarly constructed and had two fresh eggs in it. Later on in the same locality another nest was found containing seven fresh eggs. From these nests the ducks had made runs or tracks through the long grass to the water's edge. All of the eggs when found were immaculate, and entirely free from the usual feet marks of the female or stain of any kind. Two average eggs from the set of nine are oval in form, tapering somewhat sharply towards the smaller end, and are comparatively small for the size of the bird. In colour they are milk-white, with an almost imperceptible tinge of cream; smooth in texture, and having a slight satiny lustre. The shell is thick and exceedingly hard, and the finder of the nests compared it to flint when he was engaged in drilling the eggs. Length (A) 1.92×1.36 inch; (B) 1.88×1.36 inch. These eggs may be easily distinguished from those of any member of the family *Anatidæ* inhabiting Australia, by their being almost pure white. When held in the hand, and the shells are rubbed together, the sound produced is the same as if they were made of porcelain.

NEW GENERA AND SPECIES OF AUSTRALIAN FISHES.

BY J. DOUGLAS OGILBY.

In the present paper two new genera are characterised, namely, *Monothrix* for a Brotulid allied to *Dinematichthys* but differing in the dentition, the uniradial ventrals, &c., and *Austrophycis* for a Gadid, closely allied to *Physiculus* and *Silota*, with the latter of which it agrees in the forward position of the anal fin, but differs in the dentition and other particulars. Full diagnoses are given of the clupeid genera *Hyperlophus* and *Potamalosa*, in fulfilment of a promise made at last October's meeting. Ten species of fishes are described as new, namely, *Heptbranchias haswelli*, *Spratell-oides robustus*, *Kowala castelnaui*, *Hyperlophus copii*, *Mugil hypselosoma*, *M. georgii*, *Cestræus norfolcensis*, *Odon attenuatus*, *Monothrix polylepis*, *Austrophycis megalops*, and *Otophidium genyopus*. Opportunity has also been taken to make some further remarks on *Pseudomugil signifer* and *Dermatopsis macrodon*.

While examining the specimens of the notidanoid sharks contained in the collections of the Australian and University Museums, I came upon the curious jaws of which I give a description below :—

HEPTRANCHIAS HASWELLI, sp. nov.

Upper jaw.—Median tooth well developed, subulate, bent backwards but with a distinct curve towards the left, and without basal cusps; it is followed by three similar teeth and flanked by a pair of similar and but slightly larger teeth, which are directed outwards and backwards, and are provided with an inconspicuous cusp on either side of the base; these two together with the anterior tooth of the median series are inserted in advance of the functional row, which are on the same level with the second tooth of the median series; behind each of the lateral pair are three teeth which increase in size posteriorly, the last two being

provided with a pair of small cusps on either side of the base; the outer row consists of eight teeth (on each side of the second median tooth) which decrease in size from the front, and have each a prominent cusp directed more or less obliquely backwards and one or more subsidiary cusps, the second and third having a single strong acute cusp at the base posteriorly, the fourth one anteriorly and two posteriorly, the others three or four on either side; the fourth, fifth, and sixth are about equally broad at the base and conspicuously broader than the others;* between the last serrated tooth and the angle of the mouth are ten series of small chisel-shaped teeth, each series consisting of seven teeth, those in front being the largest.

Lower jaw.—Median tooth with a strong mesial cusp which is inclined towards the right and four lateral cusps on each side, the distal pair being the strongest; behind these are three similar teeth; the outer row of cutting teeth is inserted on a line with the anterior tooth of the median series; each tooth is provided with six† functional cusps which decrease in size from the front in regular gradation, the anterior and principal cusp having from five to seven serræ on its basal edge in front; these serræ increase in size outwards; the third and fourth teeth are the largest, and there are four series behind the outer row; as in the upper jaw, there are ten series of chisel-shaped teeth beyond the last cutting tooth.

Dimensions.—The distance between the base of the median tooth of the upper jaw and the end of the dentigerous portion of the palato-quadrate is three-fourths of its distance from the angle of the mouth, which is a little less than that between the last teeth of each ramus and five-sixths of that between the angles of the mouth; the distance between the middle of the base of the lower median tooth and the end of the last cutting tooth is two-thirds of the space between the two posterior cutting teeth.

Owing to the state of the jaws, I am unable to say how many series of teeth are present.

† Sometimes a minute seventh cusp is present.

Depth of gape (from angle to base of median teeth).. 212 mm.

Width of gape (from angle to angle)..... 160 „

The history of this pair of jaws, which is in the University Museum and is labelled "Cape of Good Hope?" is most unsatisfactory; briefly, as related to me by Mr. George Masters, the Curator, it amounts to the following:—

The specimen originally formed part of the old collection made by W. Sharpe Macleay, and it was only after that gentleman's death that the label was attached by order of the late Sir William Macleay, but on what grounds he believed it to come from the Cape Mr. Masters does not know. It is plain, therefore, that the locality given on the label cannot be depended on.

As the individual from which these jaws were taken is unknown, I cannot be certain as to which of the recent genera of notidanoid sharks the present species properly belongs, but it plainly comes nearest to *Heptranchias* in the presence of a strong coronal cusp to the median tooth of the lower jaw, a character which is found only in the *Squalus cinereus* of Gmelin, which is the type of Rafinesque's genus; in that species, however, the symphysis of the upper jaw is toothless.

I have much pleasure in dedicating this new and interesting Notidanid to my friend Prof William A. Haswell, whose important paper on the *Notorhynchus indicus* was published in our Proceedings some years ago.

SPRATELLOIDES ROBUSTUS, sp.nov.

D. 11-12. A. 10-11. Sc. 43-45/9.

Body rather short and stout, with the ventral profile slightly more convex than the dorsal; head moderate, its length $3\frac{3}{4}$ to $4\frac{1}{4}$, the depth of the body $4\frac{1}{5}$ to $5\frac{1}{3}$ in the total length; width of the body $1\frac{1}{2}$ to 2 in its depth; depth of the head $1\frac{3}{5}$ to $1\frac{3}{4}$, width of the head $2\frac{1}{2}$ to $2\frac{3}{5}$, of the interorbital region $4\frac{3}{5}$ to 5, diameter of the eye $3\frac{1}{3}$ to $3\frac{1}{2}$ in the length of the head; interorbital region flat; snout moderate, as long as or a little longer than the diameter of the eye. Premaxillaries inconspicuously emarginate in front;

maxillary moderately broad and falciform, with its lower border entire, its distal extremity rounded and extending to or a little beyond the vertical from the anterior margin of the eye; its length is $2\frac{6}{7}$ to 3 in that of the head, and its greatest width is $2\frac{2}{3}$ to $2\frac{6}{7}$ in its length. No perceptible teeth. Opercle with its hinder border sinuous, its lower border linear and slightly oblique, and its length $1\frac{2}{3}$ to $1\frac{4}{5}$ in its depth; subopercle very narrow; limbs of the preopercle meeting almost at a right angle, the lower not produced, the posterior linear and subvertical. Thirty-two or thirty-three gill-rakers on the lower branch of the anterior arch, the longest $1\frac{4}{5}$ to 2 in the diameter of the eye.

The space between the origin of the dorsal fin and the extremity of the snout is $1\frac{1}{2}$ to $1\frac{3}{10}$ in its distance from the root of the caudal; the second or third ray is the longest, about two-fifths longer than the base of the fin and $1\frac{1}{2}$ to $1\frac{3}{4}$ in the length of the head; the outer border is truncated or very slightly rounded: anal fin with the outer border emarginate, the third and fourth rays the longest, as long as or a little shorter than the diameter of the eye, and $1\frac{1}{2}$ to $1\frac{3}{4}$ in the length of its base, which is less than that of the dorsal, and as long as or a little shorter than its distance from the caudal; the last ray is thickened, profusely branched, and a little produced, and extends when laid back midway to the root of the caudal: ventral fin inserted from one-tenth to one-fifth nearer to the base of the caudal than to the extremity of the mandible, with the outer border rounded, the first ray simple and not quite so long as the second and third, which are $1\frac{3}{4}$ to $2\frac{1}{4}$ in the length of the head: pectoral fin with fourteen rays, the outer border rounded, the second ray simple and scarcely shorter than the third, which is longest, $1\frac{2}{3}$ to $1\frac{3}{4}$ in the length of the head: caudal fin forked, with the lobes subequal, $1\frac{1}{4}$ to $1\frac{1}{3}$ in the length of the head; the least depth of its peduncle is about one-fourth less than its distance from the anal.

Scales smooth; axillary scale of the pectoral well developed, lanceolate, much longer than that of the ventral, which is rather shorter than the diameter of the eye; a pair of oval scales along the basal half of each caudal lobe.

Upper surface of head and body deep ultramarine-blue, the sides and lower surfaces silvery more or less tinged with violet; snout and preorbitals mostly silvery: dorsal fin with a few dark dots, especially on the anterior rays: irides golden, clouded above with blue.

Distribution.—Coast of New South Wales.

Length to 70 millimeters.

Type in the Australian Museum, Sydney; register number I. 3668.

I am unable to give any information with respect to this species beyond the fact that it visits our shores annually, sometimes in enormous numbers, during the late summer and the autumn months. Not more than half a dozen examples have, however, come under my notice, and neither of the two dissected showed any symptoms of breeding. Mr. Edward Skinner, of Manly, tells me, however, that it is well known to the fishermen, by whom it is called "Tailor Maray," on account of the number of Tailors (*Pomatomus saltatrix*) which invariably accompany and feed upon them.

KOWALA CASTELNAUI, sp.nov.

D. 17-19. A. 19-21. Sc. 44-45/12.

Body ovate, the ventral profile much more convex than that of the dorsal; head rather short and deep, its length $3\frac{1}{5}$ to $4\frac{1}{5}$, the depth of the body $2\frac{2}{5}$ to $3\frac{1}{5}$ in the total length; width of the body $2\frac{1}{4}$ to $2\frac{7}{10}$ in its depth; depth of the head 1 to $1\frac{1}{5}$, width of the head $1\frac{1}{4}$ to 2, of the interorbital region $3\frac{1}{2}$ to $3\frac{3}{5}$, diameter of the eye $2\frac{4}{5}$ to 3 in the length of the head. Eye large, with the adipose lid well developed; interorbital region slightly convex; snout short and broad, one-fourth to one-third of a diameter shorter than the eye. Premaxillaries forming together a conspicuous emargination anteriorly; lower border of the maxillary rounded and finely denticulated, the upper border notched towards the tip; the distal extremity is rounded and extends to or not quite to the vertical from the anterior margin of the pupil; its

length is 2 to $2\frac{1}{2}$ in that of the head, and its greatest width is $2\frac{2}{3}$ to $2\frac{3}{5}$ in its length. Both jaws with a single series of small teeth anteriorly; a few small teeth on the palatines and along the median ridge of the tongue; vomer and pterygoids toothless. Opercle with the posterior border sinuous, the lower border oblique and feebly convex, its length $2\frac{2}{3}$ to $2\frac{3}{4}$ in its depth; subopercle deep and rhomboid, with the lower angle rounded, the upper border bent upwards and forming an acute angle with the hinder border, and its depth about three-fourths of its length; lower limb of preopercle extending forwards to below the front margin of the eye, the angle broadly rounded, the posterior border gently emarginate and vertical. Forty-four to forty-six gill-rakers on the lower branch of the anterior arch, the longest about a half of the diameter of the eye.

The space between the origin of the dorsal fin and the extremity of the snout is $1\frac{1}{5}$ to $1\frac{1}{3}$ in its distance from the root of the caudal; the fourth ray is the longest, a little longer than the base of the fin, and $1\frac{1}{5}$ to $1\frac{2}{5}$ in the length of the head; the outer border is slightly emarginate: anal fin with the outer border emarginate, the third ray the longest, as long or nearly as long as the diameter of the eye, and $1\frac{1}{2}$ to $1\frac{3}{4}$ in the length of its base, which is much less than that of the dorsal; the last ray is somewhat produced, and extends when laid back nearly to, to, or a little beyond the base of the caudal: ventral fin inserted much nearer to the base of the caudal than to the extremity of the lower jaw, with slightly convex outer border, the first ray simple and not quite so long as the second, which is $1\frac{1}{5}$ to 2 in the length of the head: pectoral fin with fifteen rays, and the outer border rounded, the third ray the longest, reaching to or a little beyond the vertical from the origin of the dorsal, and $1\frac{1}{5}$ to $1\frac{1}{2}$ in the length of the head: caudal fin deeply forked, with the lower lobe somewhat the longer, from two-fifths to one-half longer than the head; the least depth of its peduncle is more than twice its distance from the anal.

Scales thin, each with three or four vertical striae, which usually branch off from a median longitudinal stria, and with the free margin entire; axillary scale of the ventral small and triangular,

its length from four-sevenths to four-ninths of a diameter of the eye; base of the caudal fin scaly; sixteen to eighteen strong keeled scales in advance of and eleven to thirteen behind the origin of the ventral fin. Temporal region with three or four well marked parallel striæ; postfrontal area quadrangular, broadening and converging posteriorly, and traversed by a few coarse striæ; opercle with a single strong stria anteriorly and sometimes a few weaker ones along the lower border.

Upper surface blue, the back with one, two, or three more or less distinct golden, dark-edged bands, sides and lower surfaces silvery; cheeks and opercles with a golden tinge: dorsal and caudal fins more or less tinged with yellow and with their extremities black; in the former the outer border is often deeply margined with black, and the short anterior rays are densely dotted with the same colour, while there is an inconspicuous, oblique, dusky band along the middle of the fin: irides golden, clouded above with blue.

Castelnau's Herring, which is the Herring *par excellence* of the Sydney fishermen, has been generally confounded by New South Wales authors with the *hypselosoma* of Dr. Bleeker,* but the differences pointed out below will at once serve to distinguish it from that species, and I am unable to find any other with which it agrees more closely. In order to promote facility of comparison I have placed the differences on which I base my conclusions in parallel columns as below:—

K. hypselosoma.

Base of the anal fin as long as that of the dorsal.

Ventral fins inserted midway between the extremity of the mandible and the base of the caudal.

K. castelnau.

Base of the anal fin much shorter than that of the dorsal.

Ventral fins inserted much nearer to the base of the caudal than to the extremity of the mandible.

* In my *Edible Fishes and Crustaceans of New South Wales*, 1893, this fish was inadvertently named *sundaica*, a species from which it is of course entirely distinct.

K. hypselosoma.

Pectoral fin as long as the head, and reaching well beyond the origin of the dorsal.

Caudal fin $3\frac{4}{5}$ to $4\frac{1}{5}$ in the total length

Least depth of the peduncle equal to the free space between the anal and caudal fins.

Dorsal fin unicolorate.

K. castelnaui.

Pectoral fins much shorter than the head, and reaching to or nearly to the origin of the dorsal.

Caudal fin $2\frac{2}{5}$ to $3\frac{1}{5}$ in the total length.

Least depth of the peduncle twice the space between the anal and caudal fins

Dorsal fin tipped with black.

In Dr. Günther's description of *hypselosoma* the following passage occurs :—"Ventral fin inserted below the posterior half of the dorsal fin." This is quite incorrect both as regards the species under consideration and the figure of *hypselosoma* in the Atlas Ichthyologique, in which the ventral fins are directly under the middle of the dorsal, while Bleeker's description of their position is "*media tertia parte ventralibus opposita*."

The great variation in the depth of the body in specimens taken from the same shoal is liable to make one look with suspicion upon the value of this character, so much insisted on by Dr. Bleeker. One fact is, however, worthy of notice, namely, that no matter what the depth of the body may be the length of the caudal fin is invariably equal to it, so that the more slender the body is the shorter is the caudal fin, and *vice versa*; in all other respects the two forms are absolutely identical.

At the October meeting of this Society I undertook to define at an early date the two recent genera of Rough-backed Herrings, and I embrace this opportunity of redeeming my promise.

HYPERLOPHINÆ.

Anterior dorsal and abdominal profiles more or less compressed and armed with bony serræ; supplemental bone of the maxillary

narrow or wide; dorsal fin inserted above or a little behind the ventrals; anal fin moderate.

Clupeids of small or moderate size, inhabiting the seas and fresh waters of south-eastern Australia and the western shores of South America. Two or three recent genera and four species are now known.

POTAMALOSA.

Potamalosa, Ogilby, Proc. Linn. Soc. N.S. Wales, xxi. 1896, p. 504 (1897).

Body oblong, strongly compressed. Cleft of mouth oblique, the lower jaw projecting; premaxillaries but little emarginate anteriorly; maxillaries narrow. Teeth present in the jaws, on the palatines, and on the tongue; vomer and pterygoids toothless. Eye moderate, with the adipose lid little developed. Lower limb of preopercle short; suborbital bone longer than deep. Eight or nine branchiostegals; pseudobranchiae rather small; gill-rakers in moderate number, rather short and stout, serrulate. Dorsal fin originating well in advance of the middle of the body; anal fin rather short and deep, composed of eighteen or less rays; ventral fins well developed, with eight rays; inserted below the anterior fourth of the dorsal; pectorals small and pointed, with sixteen or seventeen rays; the upper ones the longest; caudal forked. Scales moderate and adherent, with the free margin rounded and entire; base of the ventral, pectoral, and caudal fins scaly; an elongate scale in the axil of the ventral; dorsal scutes prominent, but not so strong as those of the abdomen, which originate on the front of the throat; muciferous system almost confined to the main arteries. Bones of the head but little striated, the occiput almost, the opercle quite smooth. Vertebrae 46.

Etymology.—*ποταμός*, a river; *Alosa*.

Type.—*Potamalosa antiqua*, Ogilby.

Distribution.—Rivers of the eastern watershed of New South Wales.

HYPERLOPHUS.

Hyperlophus, Ogilby, Rec. Austr. Mus. ii. p. 26, 1892, and Proc. Linn. Soc. N.S. Wales, xxi. 1896, p. 505 (1897).

Body oblong or oblong-elongate, more or less compressed. Cleft of mouth oblique, the lower jaw projecting; premaxillaries moderately emarginate anteriorly; maxillaries broad. A band of small teeth along the middle of the tongue. Eye rather large, with the adipose lid much less developed in front than behind. Lower limb of preopercle short; suborbital bone longer than deep. Four branchiostegals; pseudobranchiæ large; gill-rakers in moderate number, slender, serrulate. Dorsal fin originating on or behind the middle of the body; anal fin moderate and low, composed of nineteen or more rays; ventral fins small, with eight rays, inserted in advance of the dorsal; pectorals small and obtusely pointed, with sixteen rays, the upper ones the longest; caudal forked. Scales moderate and adherent, with the free margin rounded and pectinated; base of the ventral and pectoral fins naked, of the caudal scaly; an elongate scale in the axil of the ventral; dorsal serræ feeble, not nearly so prominent as those of the abdomen, which originate on the front of the throat; muciferous system little developed and almost confined to the main arteries or greatly developed and extending well on the trunk. Bones of the head but little striated. Vertebrae 47.

Etymology.—*ὑπέρ*, above; *λόφος*, a crest; in allusion to the dorsal serrature.

Type.—*Clupea spratellides*, Ogilby.

Distribution.—Coasts of New South Wales and ? Victoria; western shores of South America.

The genus *Hyperlophus* naturally divides itself into two sections or subgenera, which may be characterised as follows:—

- a. Body oblong, strongly compressed, its depth equal to or more than the length of the head; ventral fins inserted well in advance of the middle of the body; muciferous system of the head feebly developed; a silvery lateral band (*Hyperlophus*).

Type.—*H. spratellides*.

- a'. Body elongate-oblong, slender, moderately compressed, its depth less than the length of the head; ventral fins inserted at or a little behind the middle of the body; muciferous system of the head greatly developed, extending over the shoulders; no silvery lateral band (*Omochetus*).

Type.—*H. copii*.

HYPERLOPHUS COPII, sp. nov.

D. 15-17. A. 19-20. Sc. 48-50/11-12.

Body oblong-elongate, the ventral profile more convex than the dorsal; head moderate, its length $4\frac{1}{3}$ to $4\frac{2}{3}$, the depth of the body $4\frac{3}{4}$ to 5 in the total length; width of the body $1\frac{4}{5}$ to 2 in its depth; depth of the head $1\frac{1}{2}$ to $1\frac{3}{5}$, width of the head $2\frac{1}{3}$ to $2\frac{1}{2}$, of the interorbital region $4\frac{1}{2}$ to 5, diameter of the eye $2\frac{1}{2}$ to $2\frac{2}{3}$ in the length of the head. Orbit circular; interorbital region slightly convex; snout rather short, as long as or a little shorter than the diameter of the eye. Premaxillaries forming together a well marked emargination in front; maxillary subtrulliform, with the lower border finely denticulated, extending to the vertical from the anterior border of the eye; its length is $2\frac{1}{2}$ to $2\frac{3}{5}$ in that of the head and its greatest width $2\frac{1}{3}$ to $2\frac{1}{2}$ in its length. Opercle with its posterior border emarginate, its lower border oblique and gently rounded, and its length $1\frac{2}{3}$ to $1\frac{3}{4}$ in its depth; subopercle moderate and falciform, rounded below, terminating posteriorly in an acute point, its depth $2\frac{3}{5}$ in its length; lower limb of preopercle not extending forwards to below the middle of the eye, the angle rounded, the posterior border slightly convex and subvertical. Twenty-eight to thirty gill-rakers on the lower branch of the anterior arch, the longest 2 to $2\frac{1}{2}$ in the diameter of the eye.

The dorsal fin originates a little nearer to the base of the caudal than to the extremity of the snout; the third and fourth rays are the longest, somewhat longer than the base of the fin, and $1\frac{1}{2}$ to $1\frac{3}{5}$ in the length of the head; the outer border is truncated: anal fin with the outer border truncated, the second or third ray the

longest, but little longer than the diameter of the eye, and $1\frac{4}{5}$ to 2 in the length of the base, which is greater than that of the dorsal fin and much greater than its distance from the caudal; the last ray is thickened and divided to the base and extends when laid back about one-third of the distance to the root of the caudal: ventral fin inserted midway between the extremity of the mandible and the base of the caudal, with convex outer border, the first ray simple and a little longer than the second, $1\frac{4}{5}$ to $2\frac{1}{5}$ in the length of the head: pectoral fin with the outer border rounded, the second ray simple and not so long as the third and fourth, which are the longest, $1\frac{1}{2}$ to $1\frac{3}{5}$ in the length of the head: caudal fin forked, with the lobes equal, its length $1\frac{1}{10}$ to $1\frac{1}{5}$ in that of the head; the least depth of its peduncle is a little more than its distance from the anal.

Scales with inconspicuous carinae radiating from the base; axillary scale of the ventral rather small and lanceolate, its length about two-thirds of the diameter of the eye; dorsal serrature much weaker than the abdominal, originating immediately behind the occiput, and consisting of from twenty-eight to thirty-one keeled scutes; twenty or twenty-one scutes in advance of and fourteen behind the origin of the ventral fin, those immediately in front of the fin the smallest. A single coarse stria descends obliquely downwards and backwards from the origin of the lateral ridge of the occiput across the temporal region, the space intervening between it and the eye smooth; a small triangular area on either side of the occiput smooth or inconspicuously rugose; opercle with a more or less prominent stria parallel to and near its anterior border, its upper third with feeble radiating striae. Surface of the head almost entirely covered by a network of ramifying mucous canals, which extend over the five or six anterior scales of the humeral region in the form of a corselet and are overlaid by a delicate transparent epiderm.

Pale greenish-silvery, with an obscure, dark-edged, silvery lateral band which becomes more prominent upon the tail and bifurcates at the root of the hypural bone; above this band all the scales are provided with a marginal series of blackish dots;

maxillaries and mandible with crowded, snout and interorbital region with more or less scattered similar dots; occiput deep blue; upper half of opercles with a dusky blotch; lower half, sub-, inter-, and preopercles, and the cheeks silvery: dorsal and caudal fins with a series of fine dots along each ray; a single conspicuous dot at the base of each anal ray: irides silvery, clouded above with deep blue.

This beautiful species may now be definitely enrolled as a regular autumn visitor to our coast; the first specimens of which I know were obtained by Mr. Whitelegge on the 31st of March, 1893, and a few specimens were also observed about the same time during the two succeeding years. Last year they appeared in large shoals in the middle of April, and they are again similarly abundant at the present time.

I take the opportunity of dedicating this species to the late Prof. Edward Drinker Cope, who was the first to discover and describe a herring with a dorsal serrature, in recognition of his many and valuable services to science, and as a mark of personal esteem for a valued and much regretted correspondent.*

Length to 100 millimeters.

Type in the Australian Museum, Sydney; register number, I. 3669.

MUGIL HYPSELOSOMA, sp. nov.

D. iv. i 8. A. iii 8. Sc. 40-41/14-15.

Body short and deep, not much compressed, the ventral profile much more convex than the dorsal. Length of the head $3\frac{4}{5}$ to 4, depth of the body $3\frac{1}{10}$ to $3\frac{1}{5}$ in the total length; width of the body below the origin of the first dorsal fin $1\frac{3}{5}$ in its depth;

* In the last letter which the author received from Prof. Cope, he expressed his intention of reviewing the genus *Diplomystus* in connection with the recent discovery of at least four living species. I am unaware whether this intention was carried out, but it appears to me that Cope's genus is clearly divisible into two.

depth of the head $1\frac{2}{3}$, width of the head $1\frac{2}{3}$ to $1\frac{1}{2}$, of the interorbital region $2\frac{1}{5}$ to $2\frac{1}{4}$, diameter of the eye $3\frac{2}{3}$ to 4 in the length of the head; interorbital region very slightly convex; snout very broad and obtuse, a little longer than the diameter of the eye, its upper profile slightly convex. Mouth moderate, with anterior cleft, the lips thin; premaxillaries narrow, meeting below at an obtuse angle; maxillary reaching to the vertical from the anterior border of the eye, and a little longer than its diameter, its distal half only partially concealed beneath the preorbital bone; lower lip included; the dentary bones of the lower jaw forming a very obtusely angular (almost rounded) outline in front, with a very shallow notch intervening. Both jaws with numerous series of short, subclaviform cilia, the anterior row in the lower jaw separated from the others by a smooth interspace; ectopterygoids with a patch of minute teeth; vomer, palatines, and tongue smooth. Adipose eyelid well developed and moderately opaque, reaching anteriorly a little beyond, posteriorly to the edge of the pupil. Preorbital as wide or not so wide posteriorly as the pupil; the hinder half of the lower and the posterior borders finely serrated, the former without notch, the latter rounded. Gill-rakers short and slender, 84 on the lower branch of the anterior arch.

First dorsal fin originating midway between the base of the caudal and the extremity of the snout; the spines are rather weak, the first straight, not much longer than the second, and $1\frac{8}{9}$ in the length of the head; the third spine is considerably shorter than the second, and the bases of these three are in contact; the last spine is inserted far behind the other three and is very feeble, its length being $2\frac{1}{3}$ in that of the first; the space between the origins of the two dorsal fins is as long as or a little longer than the head; the first soft ray of the second dorsal is but feebly branched and not quite so long as the second, which is as high as the first dorsal fin; the last ray is considerably produced, the outer border of the fin being deeply emarginate: the anal fin is inserted below the second dorsal, and the length of its base is $1\frac{2}{3}$ to $1\frac{1}{2}$ in its distance from the caudal; the first soft ray

is the longest and branched, as long as or a little longer than the soft dorsal rays, and when laid back does not extend to the tip of the last ray, which is much produced, the outer border of the fin being moderately emarginate: ventral fin moderate and gently rounded, inserted a little nearer to the origin of the anal than to the extremity of the mandible, with a rather weak spine; the outer ray is as long as or a little longer than the second, $1\frac{7}{10}$ to $1\frac{3}{4}$ in the length of the head, and $2\frac{2}{3}$ to $2\frac{1}{2}$ in the distance between its origin and that of the anal fin: pectoral fin but little pointed, the outer border sinuous, with sixteen or seventeen rays, the two outer ones simple; the second ray is compressed and somewhat broader than the third, which is subequal to the fourth and longest, the distance of its tip from the origin of the first dorsal being two-thirds of the length of the fin, which is two-thirds of that of the head: caudal fin large and deeply emarginate, with the tips of the lobes acute, its length $3\frac{1}{2}$ in the total length; caudal peduncle moderately compressed and strong, its least depth $2\frac{8}{9}$ to $3\frac{1}{3}$ in the depth of the body and $1\frac{1}{2}$ in its length.

Scales cycloid; snout scaly; scales of the preorbital very small; four series of scales below the eye, one of which is on the interopercle, along the upper and lower borders of which are one or two series of small subsidiary scales; axillary scale of the pectoral small; exobasal scale of the ventral as large as or a little larger than that at the base of the spinous dorsal, which extends about half way along the membrane of the last spine; second dorsal and anal fins without scaly basal sheaths, but with a series of small scales extending outwards between the two or three anterior rays.

Dark steel-blue above, silvery below, the sides with indistinct darker stripes along the rows of scales; sides of the head more or less tinged with gold: dorsal and caudal fins dusky, the latter with a tinge of yellow and narrowly bordered with blackish; anal and ventral fins silvery, with the basal third golden; pectoral fins with a narrow black basal bar above, and a brilliant silvery spot covering the rest of the base and extending some distance along the fin; remainder of the fin dusky with a narrow silvery border;

inner surface of the fin dark blue, growing gradually lighter outwards.

During the season of 1896 I procured two specimens of this gray mullet from among the scores of *dobula* exposed in the market, these two having been taken respectively in Port Jackson and Botany Bay; the largest measured 420 millimeters and is in my possession.

The great depth of this fish at once distinguishes it from *dobula*—the only species with which it could be confounded—and is the more remarkable because the examples of that species, in whose company my two specimens were taken, were all distended with more or less fully developed roe, while in these no signs of breeding could be discerned.

MUGIL GEORGII, sp.nov.

D. iv. i 8. A. iii 9. Sc. 32/13.

Body rather short and deep, moderately compressed, the dorsal and ventral profiles about equally convex. Length of head 4, depth of body $3\frac{1}{2}$ in the total length; width of body below the origin of the first dorsal fin $2\frac{1}{2}$ in its depth; depth of head $1\frac{1}{2}$, width of head $1\frac{3}{5}$, of interorbital region $2\frac{2}{5}$, diameter of eye $3\frac{3}{4}$ in the length of the head; interorbital region convex; snout obtuse, a little longer than the diameter of the eye, its upper profile rounded. Mouth small, with anterior cleft, the lips thin; premaxillaries rather broad, meeting below at an obtuse angle; maxillary not reaching as far back as the vertical from the anterior border of the eye, as long as its diameter, concealed except at its extreme tip beneath the preorbital bone; lower lip included; dentary bones of the lower jaw forming an obtuse angle in front, where they are separated by a shallow notch, the articular bones not extending back to below the front margin of the pupil. Upper jaw with a single series of small simple teeth; mandibular cilia moderate and slender, in a single series, united together so as to form a simple flexible flap; vomer, palatines, pterygoids, and tongue smooth. Adipose eyelid present, but delicate and incon-

spicuous, not nearly reaching to the edge of the pupil in front or behind. Preorbital not so broad posteriorly as the pupil, with the hinder half of the lower and the posterior borders serrated, the former with a deep notch, the latter truncated. Gill-rakers rather short and slender, about fifty on the lower branch of the anterior arch.

First dorsal fin inserted a little behind the middle of the body, the distance between its origin and the base of the caudal being eight-ninths of its distance from the extremity of the snout; the spines are rather weak, the first straight, but little longer than the second, and $1\frac{6}{7}$ in the length of the head; the third is not much shorter than the second, and the bases of these three spines are in contact, but not arranged in a straight line; the last spine is inserted at some distance behind the others, is much more feeble, and is but little more than half the length of the first; the space between the origins of the two dorsal fins is equal in length to the head; the first soft ray of the second dorsal is undivided and not quite so long as the second, which is a little lower than the first dorsal fin; the last ray is somewhat produced, and the outer border of the fin is moderately emarginate: the anal fin commences well in advance of and does not extend quite so far back as the second dorsal, the length of its base being a little less than its distance from the caudal; the first ray is the longest and branched, as long as the longest dorsal ray, and when laid back does not extend to the tip of the last ray, which is considerably produced, the outer border of the fin being rather deeply emarginate; ventral fin moderate and slightly rounded, inserted a little nearer to the origin of the anal than to the extremity of the mandible, with a rather weak spine; the outer ray is a little the longest, two-thirds of the length of the head, and half of the distance between its origin and that of the anal fin: pectoral fin pointed, with seventeen rays, the two outer ones simple; the second ray is compressed and broader than the third, which is the longest, the distance of its tip from the origin of the first dorsal being two-fifths of the length of the fin, which is nine-tenths of that of the head: caudal fin but little emarginate, with

the tips of the lobes acute, its length $3\frac{3}{8}$ in the total length; caudal peduncle deep and strongly compressed, its least depth $2\frac{1}{8}$ in the depth of the body, and $1\frac{1}{8}$ in its length.

Scales mostly cycloid, those on the cheeks, preorbitals, and lower surface feebly ciliated; snout naked; five series of scales below the eye, of which one is on the interopercle; axillary scale of the pectoral small; exobasal scale of the ventral smaller than those at the base of the spinous dorsal, of which there are two on each side, the posterior extending almost as far as the membrane of the last spine; second dorsal with a low, anal with a well developed basal sheath, and with a few small scales between the rays in both.

Back pale olive-brown, the sides silvery, the abdominal region with a golden tinge; preorbital and border of the preopercle golden, the cheeks and rest of the opercles silvery: a deep black spot in the axil of the pectoral, extending downwards along the inner side of the base; anterior ray and extremity of the second dorsal fin dusky; posterior border of the caudal fin blackish; anal, ventral, and pectoral fins yellow: irides golden.

The single specimen from which the description is drawn up was taken by net in the author's presence in the estuary of the George's River during the month of December, 1895, and measures 190 millimeters; it is in my possession. This large-scaled species was known to the fishermen who caught it, but was said to be rare, and as I have paid numerous visits to the same estuary since that date and examined scores of gray mullets from there without meeting with another example I can give that statement at least a provisional corroboration.

Note.—The examination of numerous small mullets while engaged on this quest has, however, been productive of unexpected benefit in another direction, since it enables me to determine that the fish figured by Kner (Voy. Novara, Fisch. pl. ix. f. 6) as *Mugil crenidens* is an immature *Liza peronii*, the tooth figured on the same plate belonging to *Myxus elongatus*. In arriving at this conclusion I have had the privilege of examining in a fresh state a very large series of *L. peronii* from two inches in length

upwards, with the result that I find a single series of slender simple teeth present in all specimens under six inches long.

That the species here described is not a true *Mugil* is evident from the presence of well developed teeth in the upper jaw, but, in view of the discovery above recorded with regard to *Liza peronii*, I prefer to wait until larger examples are procured before removing it from that genus.

CESTRÆUS NORFOLCENSIS, sp.nov.

D. iv. i 8. A. iii 9. Sc. 46-47/12.

Body oblong and moderately compressed, the ventral profile much more convex than that of the dorsal, which is almost linear in advance of the fins. Length of the head $3\frac{8}{9}$ to 4, depth of the body $4\frac{1}{8}$ to $4\frac{1}{4}$ in the total length; width of the body below the origin of the first dorsal fin $2\frac{1}{5}$ to $2\frac{3}{10}$ in its depth; depth of the head $1\frac{2}{3}$ to $1\frac{3}{4}$, width of the head $1\frac{3}{4}$ to 2, of the interorbital region 3 to $3\frac{1}{5}$, diameter of the eye 4 to $4\frac{1}{10}$ in the length of the head; interorbital region slightly convex; snout obtuse, one-fourth of a diameter longer than the eye, its upper profile nearly flat. Mouth moderate, with lateral cleft, the lips thin; premaxillaries narrow, evenly rounded below; maxillary not reaching quite so far as the vertical from the anterior border of the eye and longer than its diameter, its outer margin not concealed by the preorbital; lower lip included; dentary bones of the lower jaw forming a very obtuse (almost rounded) outline in front, without anterior notch; the articular bone extending backwards to beyond the middle of the eye. Upper jaw with a single series of rather strong teeth, which are narrow at the base and much swollen and tricuspid distally, the middle cusp being much the longest and strongly curved inwards; lower jaw with several series of well developed cilia, the outer row being separated from those succeeding it by a naked interspace; vomer, palatines, pterygoids, and tongue smooth. Adipose eyelid rudimentary. Preorbital not so wide posteriorly as the pupil, with the hinder half of the lower and the posterior borders denticulated, the former sinuous, the

latter subtruncate. Gill-rakers long and slender, fifty-seven on the lower branch of the anterior arch.

First dorsal fin inserted a little behind the middle of the body, the distance between its origin and the base of the caudal nine-tenths or more of its distance from the extremity of the snout; the spines are rather weak, the first almost straight, a little longer than the second, and $1\frac{9}{10}$ to 2 in the length of the head; the third is considerably shorter than the second, and the bases of these three spines are contiguous, but not arranged on a straight line; the last is inserted well behind the others and is very feeble, its length being $1\frac{9}{10}$ to $2\frac{3}{10}$ in that of the first spine; the space between the origins of the two dorsal fins is a little shorter than the head; the first soft ray of the second dorsal is branched, as long or not quite so long as the second, which is subequal in height to the first dorsal fin; the last ray is not much produced, and the outer border of the fin is feebly emarginate: the anal fin originates well in advance of and does not extend nearly so far back as the second dorsal, and the length of its base is $1\frac{1}{10}$ to $1\frac{1}{4}$ in its distance from the caudal; the first soft ray is as long as the second and branched, longer than the soft dorsal rays, and when laid back extends to or not quite to the extremity of the last ray, which is not or but little produced, the outer border of the fin being feebly emarginate: ventral fin well developed, with the outer border subtruncate, inserted nearer to the origin of the anal than to the extremity of the mandible, with a rather feeble spine; the outer ray is the longest, $1\frac{3}{5}$ to $1\frac{2}{3}$ in the length of the head and 2 to $2\frac{1}{10}$ in its distance from the origin of the anal fin: pectoral fin pointed, with sixteen rays, the two outer ones simple; the second is but little stronger than the third, which is the longest, the distance between its tip and the origin of the spinous dorsal being a little more than half of the length of the fin, which is $1\frac{2}{3}$ in the length of the head: caudal fin forked, with the tips of the lobes acute, its length $3\frac{3}{4}$ to $3\frac{1}{5}$ in the total length; caudal peduncle moderately compressed, its least depth $2\frac{1}{3}$ to $2\frac{2}{5}$ in the depth of the ^{1st} th, and $1\frac{2}{5}$ to $1\frac{3}{8}$ in its length.

Scales cycloid, except those of the cheeks, preorbitals, and ventral surface, which are finely ciliated; snout naked; preorbital scales moderate; four series of scales below the eye, one being on the interopercle; axillary scale of the pectoral rudimentary; exobasal scale of the ventral smaller than that of the spinous dorsal, which extends about half-way along the membrane of the last spine; dorsal fin without, anal with a basal scaly sheath; both with a series of small scales between each pair of rays anteriorly.

Blue above, silvery below, the head and sides washed with bronze; some of the scales of the upper surface with a golden spot: a small black spot in the axil of the pectoral; dorsal, pectoral, and caudal fins dusky, the latter tinged with yellow; anal and ventrals yellowish: irides golden.

Two specimens of this very distinct mullet were brought back from Norfolk Island in April, 1896, by the Hon. J. H. Carruthers, on the occasion of his visit to that island for the purpose of proclaiming it a dependency of New South Wales. The largest example measures 255 millimeters, and they are now in my possession.

PSEUDOMUGIL SIGNIFER.

In my paper entitled "A new family of Australian Fishes" (*Proc. Linn. Soc. N.S. Wales*, xxi. 1896, pp. 118-135) the following passage occurs (*p.* 123):—"In the Voyage Novara it is alleged that the fishes, from which Prof. Kner's description was drawn up, were collected at Sydney, but this is manifestly erroneous, &c., &c." For this statement I must apologise to Prof. Kner and at the same time confess that the error was on my part, as I have myself assisted in obtaining several specimens of this beautiful little fish from Cook's River, where it is common, frequenting the dense masses of weed (*Ceratophyllum demersum*, &c.), which fringe the banks, a single sweep of a small hand net sometimes resulting in the capture of these fishes and the fry of our four common Gudgeons, *Carassiops longi*, *Micrpterus australis*, *Mulgoa coxii*, and *Ophiorrhinus grandiceps*. en

The brilliant orange and black vertical fins of the male fish make it a most conspicuous object, and in this case incidentally led to my paying a visit to its haunts and to the consequent rediscovery of the species, I having been told by Mr. Albert Gale, late Lecturer to the Technical College, of a "golden-finned, blue-eyed fish, rarely more than an inch long," which he sometimes caught when seeking for specimens for his fresh-water aquarium; not being able to place the fish in question, I accompanied Mr. Gale in one of his excursions, with the above pleasing result.

ODAX ATTENUATUS, sp. nov.

D. xx 15. A. i 9. V. i 4. P. 13. Sc. $43\frac{4}{8}$.

Body elongate and slender; upper profile of head convex, its length $4\frac{2}{3}$, the depth of the body $8\frac{4}{5}$ in the total length; depth of head $2\frac{3}{5}$, width of head $2\frac{1}{2}$, of interorbital region $5\frac{3}{4}$, diameter of eye $3\frac{2}{5}$ in the length of the head; snout moderate, rounded in front, one-third of a diameter longer than the eye; interorbital region flat. Jaws equal, the maxillary extending backwards midway to the eye, its length $5\frac{3}{4}$ in that of the head. Preopercle entire.

The dorsal fin commences above the lower angle of the base of the pectoral, the space between its origin and the extremity of the snout being $2\frac{4}{5}$ in its distance from the base of the caudal fin; the rays increase in length to nearly the end of the fin, the longest being $2\frac{1}{4}$ in the length of the head: the anal fin originates below the twenty-first and terminates below the twenty-sixth dorsal ray: ventral fin long and narrow, inserted below the commencement of the middle third of the pectoral, its length $1\frac{7}{10}$ in that of the head, and $2\frac{2}{3}$ in the space between its origin and the vent: pectorals rounded, the upper middle rays the longest, $1\frac{3}{5}$ in the length of the head: caudal peduncle long and slender, its least depth $2\frac{3}{4}$ in the distance between the dorsal and caudal fins.

Upper half of the head and trunk and the tail brown, many of the scales with a darker central spot; lower half of the head and

the abdominal region brownish-yellow: an oblong deep blue spot near the distal extremity of the ventral fin.

Distribution.—Tasmania.

Length (without caudal fin) 95 millimeters.

Type in the Tasmanian Museum, Hobart.

The unique example from which my description is drawn up has been entrusted to me for identification and diagnosis by Mr. Alexander Morton, Curator of the Tasmanian Museum, and is unfortunately in bad condition, several of the rays of the dorsal and anal fins and the entire caudal fin having been broken off; it appears to have been washed ashore and partially sun-dried.

It is easily distinguishable from nearly all the other members of the genus by the great tenuity of the head and body, in which it approaches *Siphonognathus*. Of the species included in Dr. Günther's Catalogue, it approaches most nearly to Quoy and Gaimard's *Malacanthus radiatus*, but it differs from the south-western continental form in the more distinctly attenuated habit, the non-prolongation of the anterior dorsal and the ventral rays, the number of the dorsal and anal rays.

I would have unhesitatingly identified my fish with Mr. Johnston's *Odax beddomei* if it were not that some of the characters relied on by that author, if correct, make such a course impracticable.

As some of my readers may not be able conveniently to refer to Johnston's description and as it will take up but little space, I transcribe it *in extenso* from the Proceedings of the Royal Society of Tasmania, 1884, p. 231, in order to facilitate comparison.

Odax beddomei.

D. 20/12. A. 3/9. P. 12/14. L. 1. 40. L. tr. 3/8-9.

Body elongate. Preoperculum entire. Snout much produced and finely pointed. Eye rather large. Height of body one-tenth of the total length and length of head contained in the latter three and one-third times. Upper posterior margin of operculum produced into a flaccid membrane having a rayed appearance. Colour of body and fins reddish, becoming lighter below lateral

line. There is a singular well-marked black elongate streak, margined with a scarcely perceptible yellow border, extending over five of the upper rays of the caudal fin, which latter is somewhat rounded terminally.

Total length $4\frac{3}{4}$, length of body 4, of head $1\frac{1}{3}$, of snout $\frac{8}{12}$, greatest depth of body $\frac{11}{4}$, least depth of body $\frac{1}{4}$ inches, diameter of eye 6 millimeters.

In the above description the number of the fin rays and of the series of scales agrees fairly well, especially as regards the increase (over all the other known species) in the dorsal spines and the decrease in the anal rays.* The discrepancy in the enumeration of the transverse series of scales may be explained away by the fact that my computation was made at the point where the greatest number of scales occurred between the dorsal profile and the lateral line, while Mr. Johnston's was taken at some anterior point, possibly from the origin of the dorsal fin.

The two specimens (Johnston's and Morton's) were almost of the same length—100 mm. and 95 mm. without the caudal fin respectively, and the comparative measurements should therefore have been identical or at least approximate, and such we find to be the case so far as the depth of the body is concerned; but here the similarity ceases, for in Johnston's specimen the head is said to be contained three and one-third times in the total length with the caudal fin and three times without it, while in my specimen the head is four and two-fifths in the total length without the caudal, and even if the cutaneous appendage to the opercle should be included this measurement is only reduced to four and one-fifth. Again Johnston's measurements show the eye—which he describes as "rather large"—to have been contained five and a half times in the length of the head and twice

* Mr. Johnston has recorded three spinous rays as being present in the anal fin of his example, but a most careful investigation under the microscope, both by Mr. Whitelegge and myself, has been unsuccessful in bringing to light more than a single spine in Mr. Morton's fish.

in that of the snout,* while in Morton's example the corresponding figures are only a trifle more than four in the head—dermal flap included—and one and a third in the snout.

If, therefore, Johnston's measurements be correctly given, I am compelled to consider his species as different from mine.

DERMATOPSIS MACRODON.

Since publishing the description of this species (*Proc. Linn. Soc. N.S. Wales*, xxi. 1896, p. 140) a second example, not quite so large as but in much better condition than the type, has been discovered among a number of small, principally immature, fishes collected at various times by Mr. Whitelegge on Maroubra Beach and handed by him to me for identification and, if necessary, description.

An examination of this specimen has enabled me to supplement or correct the original diagnosis in the following particulars:—

The depth of the body is $5\frac{1}{2}$ in the total length, the abdominal region not being shrunk as in the type; the eye is only perceptible as a dull bluish patch, which is scarcely larger than that covering the posterior nostril, to which it has a similar appearance; its diameter is apparently about one-twelfth of the length of the head; the profile of the snout is distinctly rounded; the jaws are of equal length and the lower labial flap is absent; there are two distinct dorsal tubercles, the anterior situated immediately in advance of the vertical from the base of the pectoral; its distance from the posterior is about two-thirds of that between the latter and the origin of the dorsal fin, this distance being as long as the space between the posterior nostril and the extremity of the snout; the dorsal fin originates somewhat further back, its distance from the extremity of the snout being $3\frac{2}{3}$ in the total length, while the origin of the anal is distinctly in advance of the middle third of the dorsal and a little nearer to the base of the caudal than to the extremity of the snout; the length of the

* These measurements agree with those of the small-eyed *richardsonii*.

ventral fin is $1\frac{1}{2}$, of the pectoral $1\frac{2}{3}$ in that of the head, and the caudal fin has fourteen rays. The lower surface of the head, lips, cheeks, and abdomen are white, and the vertical fins are brown with a conspicuous whitish border.

In addition to those mentioned at the end of the generic description (*loc. cit.* p. 139), there is a single large pore above the upper angle of the gill-opening; there is no indication whatever of a lateral line.

The specimen measures 69 millimeters.

Dinematichthys consobrinus, Hutton, from the New Zealand coast, is said by Hector to have two small spines in front of the dorsal fin and may belong to *Dermatopsis* (see Trans. N.Z. Inst. viii. 1876, p. 217, and ix. 1877, p. 466, Pl. ix. f. 77a).

MONOTRIX, gen. nov.

Body rather elongate and compressed, especially behind; head moderate, the snout short and blunt; mouth anterior and rather wide, with moderate, oblique cleft. Premaxillaries slightly protractile, forming the entire dentigerous portion of the upper jaw; maxillary narrow in front, abruptly expanded behind, extending backwards well beyond the eye; anterior border of the expanded portion bent forwards so as to form a conspicuous odontoid process. Nostrils supero-lateral, of equal size, widely separated, and surrounded by a skinny vesicular lip. Eyes small and supero-lateral, covered by transparent skin. Opercles covered by a continuous skin; opercle with two strong spines, only the upper of which pierces the skin. Gill-openings large, extending forwards beyond the vertical from the distal extremity of the maxillary; isthmus narrow; seven branchiostegals; pseudo-branchiæ present; gill-rakers in very small number, tubercular. Jaws with a narrow band of minute villiform teeth anteriorly, succeeded after a considerable interspace by a series of short, stout, caninoid teeth, which extend backwards along the sides of the rami; a crescentic band of minute teeth on the vomer with a few larger ones interspersed, the outer tooth on each side much enlarged; palatine teeth in a long, narrow band with the outer

series enlarged and conical; pterygoid bones and tongue smooth. No perceptible spinous tubercle in advance of the dorsal fin; dorsal and anal fins low, separated from the caudal by a distinct interspace: ventral fins long, inserted close together and well behind the isthmus, reduced to a slender, simple filament, composed of a single articulated ray: pectorals well developed, pointed, composed of twenty slender, mostly divided rays: tail homocercal, the caudal fin narrow. Genital papilla present. Scales small, cycloid, and imbricate; head naked; only the basal portion of the vertical fins enveloped in loose, naked skin. No conspicuous open pores on the head; bones of the snout and interorbital region cavernous. No apparent lateral line.

Etymology.—*μόνος*, single; *θρίξ*, a hair; in allusion to the single, filiform, ventral ray.

Distribution.—Coast of New South Wales; ? Andaman Archipelago.

MONOTRIX POLYLEPIS, sp. nov.

D. 95. A. 53 + x. Sc. 135.

Body moderately elongate, strongly compressed posteriorly. Head moderate, its length $4\frac{1}{2}$, the depth of the body 6 in the total length; depth of the head $1\frac{1}{4}$, width of the head $1\frac{3}{4}$, of the interorbital region $5\frac{1}{3}$, diameter of the eye $7\frac{2}{3}$ in the length of the head; snout blunt, with rounded profile, covered with thick loose skin, two-thirds of a diameter longer than the eye; interorbital region slightly convex and rugose. Mouth rather large, its cleft oblique, extending nearly to the vertical from the middle of the eye; the premaxillaries are but little protractile; they form the entire dentigerous portion of the upper jaw, have the lateral portion well developed and of about equal width throughout, and do not extend backwards as far as the anterior border of the maxillary, which is narrow in front, the posterior third being abruptly expanded; the front margin of the expanded portion is curved downwards and forwards so as to form a strong odontoid process; behind this process the lower half of the hinder margin is scalloped, the upper half subtruncate with the angle rounded;

the maxillary extends to about one diameter behind the eye, its length being $1\frac{9}{10}$ in the head, and its greatest width, including the process, half of a diameter more than the eye; the jaws are of equal length, and the lower is provided with a free lip, which is shallow in front and forms a deep flap on the sides; the dentary bone reaches backwards almost as far as and along the inner side of the expanded maxillary. Both jaws are armed with a narrow band of small acute teeth anteriorly, behind which and separated by a considerable interspace is a single series of short stout teeth, which extend backwards along the sides almost to the angle of the mouth, and some of which, especially on the sides of the lower jaw, are provided with a broad base and strongly hooked backwards and inwards; a crescentic band of minute teeth on the head of the vomer, among which are placed at regular intervals a few long, slender, detached teeth, those at the outer ends being the largest; palatine teeth in a narrow band, which extends as far back as those of the premaxillaries; the outer series is enlarged and conical, the rest minute and sharp pointed; pterygoid bones and tongue edentulous. Both nostrils are of moderate size, circular, and surrounded by a low skinny rim; the anterior pair are situated on the front edge of the nasal bone and are as large as and somewhat more approximate than the posterior, which open immediately in front of the middle of the eye. Eye small, entirely covered by a delicate membrane. Opercle with two strong spines, the upper one horizontal and approximating to the upper border, with acutely pointed free tip; the lower directed obliquely downwards and backwards and entirely concealed beneath the loose skin, which is continuous across the gill-covers. Gill-rakers reduced to two or three smooth knobs near the joint of the anterior arch.*

No perceptible dorsal tubercle; the dorsal fin originates a little in advance of the middle of the pectoral, and its distance from the extremity of the snout is $3\frac{2}{3}$ in the total length; the rays are slender and deeply branched, those of the third quarter a little

* As well as can be seen from an outward view

the longest, $2\frac{3}{5}$ in the length of the head : the anal fin commences beneath the origin of the second quarter of the dorsal and is in all respects similar to that fin; the space between its origin and the extremity of the mandible is $1\frac{1}{5}$ in its distance from the base of the caudal fin : ventral inserted but little in advance of the free margin of the opercle, as long as, the pectoral two-thirds of the length of the head : caudal fin with rounded base and fourteen rays.

Pale yellowish-brown, with the fins lighter.

The unique specimen was picked up on the beach at Maroubra by Mr. Whitelegge; it was dead, but quite fresh, and in a perfect condition, but for the loss of about half of the caudal fin ; a portion of the anal, consisting of from fifteen to eighteen rays, and commencing at the tenth ray, is also missing.

Length 55 millimeters.

Type in the Australian Museum, Sydney ; register number I. 3654.

Monothrix polylepis agrees fairly well with Mr. Alcock's *Dinematichthys piger* (*Ann. & Mag. Nat. Hist.* (6) vi. 1890, p. 432), from which, however, it may at once be distinguished by its much smaller scales and more numerous dorsal and anal rays; possibly also by the shape of the maxillary.

The character of the dentition and the uniradial ventrals separate these two species from *Dinematichthys* and its allies.

AUSTROPHYCIS, gen. nov.

Body moderately elongate and strongly compressed throughout. Head rather large and tumid, with short rounded snout; mouth anterior, with wide oblique cleft; lower jaw included; chin with a barbel. Premaxillaries slightly protractile, forming the entire dentigerous portion of the upper jaw; maxillary narrow, its distal extremity exposed and but little expanded. Upper jaw with a narrow band of small cardiform teeth, the two outer series enlarged and separated from the inner portion, which is triserial, by a distinct interspace; lower jaw with three series of teeth similar to the outer premaxillary ones; vomer, palatines, pterygoids, and

tongue edentulous. Nostrils approximate, pierced in a deep depression in front of the eye. Eyes very large, supero-lateral. Opercle with a feeble spine, which does not pierce the skin and with the border serrated. Gill-openings wide, extending forwards to below the angle of the mouth; isthmus wide; six branchios-tegals; gill-rakers in small numbers, distant, serrulate. Dorsal fins two, the first well developed, with ten rays; second dorsal and anal fins long and low, the latter the longer and originating below the middle of the dorsal interspace, separated from the caudal by a short interspace: ventral fins widely separated, inserted but a short distance behind the isthmus, and consisting of five slender rays standing upon a narrow base: pectorals well developed, pointed, composed of twenty-five slender, simple rays: tail homocercal, the caudal fin narrow. Scales of moderate size, cycloid, and imbricate;* vertical fins apparently enveloped in great part in thick skin.

Etymology.—*Auster*, south; *Phycis*.

Distribution.—Coast of New South Wales; Maroubra Bay.

This genus is allied to *Physiculus*, but the character of the dentition, the armature of the opercle, and the anterior origin of the anal fin afford valid grounds for the formation of a new genus as here proposed.

AUSTROPHYCIS MEGALOPS, sp.nov.

D. 10, 45. A. 49.

Body moderately elongate and strongly compressed, not attenuated posteriorly. Head large and tetrahedral, its length $4\frac{1}{2}$, the depth of the body 6 in the total length; depth of the head $1\frac{1}{2}$, width of the head $1\frac{7}{10}$, of the interorbital region $4\frac{6}{7}$, diameter of the eye $2\frac{5}{8}$ in the length of the head; snout short and blunt, with the upper profile concave owing to the prominence of the supra-orbital region, its length about two-thirds of the diameter of the

* Owing to the bad state of the specimen, only a few scattered scales remain *in situ*.

eye*; interorbital region slightly concave. Mouth large, with oblique cleft, which extends to the vertical from the anterior margin of the pupil; the premaxillaries are but little protractile; they form the entire dentigerous portion of the upper jaw; the lateral portion is equally slender throughout and does not extend backwards so far as the maxillary, which is narrow and feeble, only the extreme distal portion being slightly expanded and spatuliform and reaching to the vertical from the posterior margin of the pupil; its length being a half of that of the head; lower jaw included; the chin with a median barbel, which extends when laid back to the isthmus.

In front of the eye there is a deep pyriform depression which is narrowest forwards, along the inner side of which the anterior and larger nostril opens, while the posterior is pierced along its orbital face and further out than the other. Eye very large and prominent, encroaching upon the upper surface of the head and extending downwards over three-fifths of its side; all the bones of the orbital ring more or less prominent, but especially in front and behind the eye. The upper border of the opercle bears a conspicuous ridge which terminates in a feeble spine which is concealed beneath the skin and is scarcely perceptible; the entire surface of the bone is ornamented with radiating striae, the extremities of which form a distinct though weak marginal serrature. Eight gill-rakers on the lower branch of the anterior arch, the longest at the angle and one-fourth of a diameter of the eye in length; the last two are very small and the front half of the arch is quite smooth.

The first dorsal fin originates well behind the base of the pectorals, its distance from the extremity of the snout being $3\frac{1}{2}$ in the total length; the first ray is rather short, the others slender and more or less elongated, the fifth the longest, half the length of the head; there is a moderate interspace between the dorsal fins, which does not appear to have been occupied by membrane; the second dorsal commences a little behind the vertical from the

* In its contour it has a perceptible resemblance to some of the Muraenids.

origin of the anal, the distance between which and the extremity of the mandible is $1\frac{4}{5}$ in its distance from the base of the caudal: * ventral inserted below the posterior border of the eye, composed of five rays, standing on a narrow base. the two outer ones being elongate, the others short, slender, and filiform; the second ray is the longest, not quite reaching to the origin of the anal, its length $1\frac{1}{3}$ in that of the head: pectoral fin pointed reaching well beyond the origin of the anal, and $1\frac{2}{3}$ in the length of the head: caudal fin rounded, with twenty slender, mostly branched rays, and numerous short unarticulated ones, extending forwards nearly as far as the dorsal and anal fins, above and below, its length $8\frac{2}{5}$ in the total length.

Pale brownish-yellow, the snout, orbital ring, dorsal and caudal fins, and the outer border of the anal, especially near its termination, much darker; throat and abdomen silvery.

This is yet another of my friend Mr. Whitelegge's Maroubra Bay discoveries, the single specimen as yet known having been picked up by him on the beach in a somewhat shrivelled and sun-dried condition.

Length 73 millimeters.

Type in the Australian Museum, Sydney; register number I. 3655.

OTOPHIDIUM GENYOPUS, sp.nov.

Body moderately elongate, strongly compressed, tapering very gradually to the base of the caudal fin; its depth at the shoulder one-seventh of its length; head of moderate size, with the upper profile very convex; its length one-fifth of the total length; its depth two-thirds, its width four-ninths of its length; snout short and rounded in front, projecting beyond the lower jaw, which is

* Owing to the state of the specimen I am unable to determine with accuracy the position and length of the longest dorsal and anal rays, but some of those in the posterior third of the latter fin are about half the length of the head.

included; mouth with moderate, nearly horizontal cleft, the premaxillaries extending backwards almost as far as the maxillaries; maxillary reaching to the vertical from the posterior margin of the eye, expanded and truncated behind, its length four-ninths of that of that of the head, its width three-tenths of its length. Jaws with a band of small conical teeth, which are divided into two series by a median longitudinal groove, each series consisting of two or more rows; vomer and palatines toothed. Nostrils widely separated, the anterior situated near the tip of the rounded snout, the posterior in front of the middle of the eye; an open pore, similar in appearance to the posterior nostril, above and a little behind the front margin of the eye. Eye large, its diameter one-third of the length of the head; interorbital region convex, its width equal to the length of the snout and two-ninths of the length of the head. Opercular spine strong and acute, its exposed portion two-fifths of the diameter of the eye.

The dorsal fin commences above the middle of the pectoral, the distance between its origin and the extremity of the snout being $3\frac{2}{5}$, that between the origin of the anal and the snout $2\frac{2}{5}$ in the total length; the rays of both fins increase in length posteriorly, the longest being on either side of the caudal fin, and as long as it: ventral inserted below the anterior third of the orbit, and extending when laid back beyond the base of the pectoral, the length of the longer filament four-fifths of that of the head: pectoral pointed, four-sevenths of the head, and extending about two-thirds of the distance between its base and the vent: caudal very small, rounded, about half the diameter of the eye in length. Scales very small, deeply imbedded.

Pale gray-green, everywhere powdered with microscopic darker dots, except along a broad lateral band, the cheeks, preopercles, undersurface of head, and abdominal region, the latter being silvery; occiput with a reddish-brown tinge and the dots coalescent into small round spots; the dots along the base of the dorsal and anal fins similarly coalescent into a narrow dark streak: irides pale blue.

The species differs from *Otophidium tigrinus* in its shorter and deeper body, longer head, much larger eye, anterior insertion and much greater length of the ventral filaments, absence of an enlarged outer row of teeth, &c., and should not perhaps be included in the same genus.

The only specimen as yet seen was collected by Mr. Whitelegge on Maroubra Beach during the current month and measures 42 millimeters.

Its register number in the Australian Museum is I. 3660.

ON THE DEVELOPMENT OF *HETERODONTUS*
(*CESTRACION*) *PHILLIPI*.

PART I.

BY PROFESSOR WILLIAM A. HASWELL, M.A., D.Sc.

(Plates IV.-V.)

During a zoological expedition undertaken in September, 1893, for the purpose of exploring the marine zoology of Jervis Bay, a part of the New South Wales coast to the fauna of which little attention had been directed, I was struck by the unusually large number of the egg-shells of *Heterodontus* (*Cestracion*) which were to be seen on the beaches. Most of them were old and broken, usually covered with the tubes of *Eupomatius*; but after examining a number, I succeeded in obtaining a fresh one containing an egg with an early blastoderm. Eventually I found that many of these were to be found at low tide sticking in the crevices of the rocks, firmly wedged in by means of the spiral flange which forms such a remarkable feature of the egg-shell; and with the help of Mr. J. P. Hill, who was of the party, I succeeded in collecting a considerable number. Of these as many as possible were preserved in the camp, but a large number were taken whole to Sydney, and more satisfactorily dealt with in the laboratory: Mr. Hill, on a second trip to the same locality, brought back a good many more. Some of these were kept alive for days in the laboratory. The cutting of a door in the egg-shell did not seem to interfere with the development, and, with proper appliances for renewing or aerating the sea-water, I have little doubt that it would be possible in this way to follow the course of the development for a prolonged period. This I hope to be able to do with regard to the later stages at some future time. The present communication refers only to the stages prior to the appearance of the notochord: detailed reference to the literature is deferred. I am much

indebted to my demonstrator, Mr. J. P. Hill, not only for help in obtaining the specimens, but also for preserving many of the blastoderms, for making measurements and indicating approximately the stage which each had reached, and for sectioning many of them.

Cestracion (*Heterodontus*) is a genus which is almost unique among the Elasmobranchs in having been represented by near relatives as far back as the Carboniferous period. Although the adult structure of the members of the family had even at that early period become highly specialised and widely divergent from the main line of Elasmobranch evolution, the hope is not an unreasonably sanguine one that the embryonic development of a type so ancient might exhibit some important primitive features. With regard to the stages now described, however, any expectations of the kind cannot be said to have been fulfilled; and what impresses one most in the results is the extraordinary persistency of certain characteristics which are not known to have any vital significance. There can be little doubt, for example, that the "orange spot" which forms such a striking feature of the egg of an Elasmobranch in its early stages, has been handed down with little change from Palæozoic times.

The blastoderm occupies a constant position in the egg. It is always situated much nearer the broader than the narrower end of the egg-shell. The extremity of the blastoderm destined to become posterior is always directed away from the broader end of the egg-shell. Balfour* states that in *Pristiurus* the blastoderm is similarly constant in its position near the rounded end of the egg, while in *Scyllium* it is always near the narrow end to which the shorter pair of filaments is attached.

The blastoderm, in its earlier stages, appears to the naked eye, as in other Elasmobranchs,† as a circular reddish orange spot, around which is a narrow light yellow band. When this orange spot has attained a diameter of about 2 mm. it assumes an oval shape, its

* Balfour, Development of Elasmobranch Fishes, p. 10.

† L.c. p. 10.

longer axis corresponding with the future long axis of the body. At its posterior end appears a crescentic dark area which has very much the appearance of a cleft passing right through the blastoderm, but which sections prove to be a cavity, the segmentation cavity, covered over by a thin transparent roof. As the blastoderm extends, this dark area becomes less strongly marked and gradually disappears.

The yolk is covered with a thin investment which is perfectly continuous with the non-nucleated protoplasmic network of the substance of the yolk, of which it is to be looked upon as a specially modified part.

The light yellow band referred to above extends more rapidly than the blastoderm, and soon forms a broad zone around the latter. As it extends its boundaries become more and more indistinct. This is due to the spreading out of the bed of fine-grained parablasic substance on which the blastoderm lies. A number of small rounded spots, which appear scattered over it, are found on the examination of sections to be produced by the development of rounded spaces or vacuoles.

The earliest specimen of which satisfactory sections were obtained (Fig. 1) is one in which the fine-grained bed of yolk extends beyond the edge of the blastoderm to rather more than half of the diameter of the latter. In this stage the blastoderm consists of a lenticular mass of chiefly rounded cells, resting directly on the fine-grained substance in the greater part of its extent, but becoming separated from the latter towards the posterior end by a small segmentation cavity. The most superficial layer of cells are closely packed together: they are irregular in size and shape, but form a tolerably definite layer. In the deeper strata the cells are more loosely arranged, with intercellular spaces. In these, as in the segmentation cavity, with which they are more or less directly continuous, there are irregular masses and strands of a finely granular material, which is strongly coloured by staining agents; frequently this matter adheres to the surface of the cells or the wall of the segmentation cavity so as to form a distinct investment: from its appearance and mode of occurrence this material

is, without much doubt, of the nature of a coagulum formed as a result of the action of the fixing solutions on a fluid contained in the segmentation cavity.

Balfour (p. 53) remarks on the frequent presence of a membrane-like structure between the blastoderm and the yolk, readily affected by staining agents, and sets it down as a layer of coagulated albumen. Perenyi,* on the other hand, states that in *Torpedo marmorata*, the yolk is enclosed in a fine structureless membrane.

The mass of fine-grained substance contains a small number of nuclei. Its upper surface, forming the floor of the segmentation cavity, is raised up here and there into a rounded mass containing a nucleus. Continuous with the mass of parablast material which lies below the blastoderm is a thinner layer extending out some distance beyond the edge of the blastoderm. This is continuous with the posterior edge of the latter, and at this point contains several nuclei. Cell divisions at this stage seem to be going on somewhat slowly, as the majority of nuclei are in the resting stage.

In *Pristiurus*, to judge from Balfour's account, the segmentation cavity makes its appearance only at a considerably later stage. (Compare his figures 8 and 9, of Plate ii., and 1 of Plate iii.)

In the stages which immediately follow on that just described, though the blastoderm (Figs. 2 and 3) does not at first increase in size, the cells multiply by division so as to become much more numerous and smaller. The massive blastoderm becomes much thicker in front than behind. The segmentation cavity increases in extent, and forms in the middle a comparatively wide space covered over dorsally behind by a thin stratum formed by material which is transitional between the posterior portion of the blastoderm and the parablast. Cells soon cease to become formed from the parablast of the floor of the cavity; but a part

* "Beiträge zur Embryologie von *Torpedo marmorata*." Zool. Anz. ix. (1886).

of the parablast of its roof appears to divide into cells which are added to the posterior part of the blastoderm. A distinct upper layer of the blastoderm ("ectoderm" of various authors) is no longer recognisable.

C. K. Hoffmann* states that in *Acanthias*, at a stage in the development of the blastoderm which corresponds broadly with that just described, there is an invagination- or gastrula-cavity opening widely by a blastopore on the exterior. The mode of formation of this gastrula-cavity, he avers, is closely comparable to the gastrulation in Amphibia, Cyclostomi and Amphioxus. If we are to accept the statement that the cavity in question is a gastrula cavity, then necessarily we must admit the justness of the comparison with the corresponding cavities in other Chordates. Such an admission, however, would involve us in the greatest difficulties. For here we should have an invagination which is not connected with the formation of the archenteron or of the mesoderm or notochord, an invagination-cavity which virtually disappears before the first rudiment of the mesoderm has become differentiated. I do not think, however, that the statement of fact can be taken without confirmation, and am confident that more thorough investigation will show that *Acanthias* does not depart so widely from other Elasmobranchs in such an essential phase of its development. I have several series of sections of blastoderms of *Heterodontus* at or about the stage represented in fig. 3. These, so far as they were examined in the fresh state, all presented the appearance described by Hoffmann, an appearance seeming to indicate the presence of an open cavity below the posterior edge of the blastoderm. In one of them only does the cavity open on the exterior; and in this the opening is readily seen on a careful examination to have resulted from a rupture of the delicate roof of the cavity, most probably during the removal of the blastoderm from the egg.

* "Beiträge zur Entwicklungsgeschichte der Selachii," Morph. J.B. 1896.

In brief, I contend that the cavity represented in my figs. 1-4 is in all cases the same thing, viz., the segmentation-cavity, and that Hoffmann's fig. 4, of Taf. ii. corresponds, or should correspond with my fig. 3. This is a phase which was apparently not represented in the specimens at Balfour's disposal.

The blastoderm now increases somewhat in diameter, though still remaining very thick anteriorly. The segmentation-cavity has somewhat increased in size, and extends under the entire blastoderm. At its posterior end, just below and somewhat in front of the posterior limit of the blastoderm, appears a collection of cells of irregular shape, some of which are evidently being formed from the parablast of the floor of the cavity. Only a very few similar cells occur further back. This accumulation of cells, which extends all round the posterior margin, forms the starting point in the formation of the parablast endoderm.

The next change of importance (Fig. 5) is the arching upwards of the posterior portion of the blastoderm, so that where it passes into the parablast it becomes for a short distance vertical, and soon inclined forwards, forming the embryonic rim, which extends round the entire posterior margin. At the same time the accumulation of cells at the posterior end greatly increases and becomes extended backwards as a thin layer (yolk endoderm) over the entire floor of the segmentation-cavity. These cells now send off processes which apparently join the processes of neighbouring cells, so that the whole comes to form a reticulum, in the meshes of which are to be recognised masses of the coagulum from the fluid of the segmentation-cavity. Similar cells extend backwards as a thin irregular layer immediately below the blastoderm in the roof of the segmentation-cavity. The blastoderm has now become considerably thicker, but still remains thickest towards the anterior end.

The embryonic rim now becomes more strongly inflected (Fig. 6), and the blastoderm becomes greatly extended anteriorly, at the same time becoming thinned out. The segmentation-cavity extends *puri passu* with the extension of the blastoderm, but becomes extremely shallow. The parablast endoderm extends over its floor,

but, unless the constituent cells are united by long processes, cannot be said to form a continuous layer. There is every appearance that at this stage there is an active formation of parablast endoderm cells from the fine-grained parablast below the embryonic rim; and its substance soon becomes completely divided up into cells. Further forward a similar process goes on, though less actively. A change at the same time takes place in the form and arrangement of the cells of the blastoderm. In the neighbourhood of the embryonic rim they become vertically elongated, their arrangement approximating more and more to that of the cells of a columnar epithelium, while behind they remain more irregular in shape, and form a stratum several cells thick. It is of importance to observe that, whereas previous to the stage now reached all the cells of the blastoderm were filled with yolk-granules of the smaller size, the vertically-elongated cells now contain yolk only in their lower portions.

Balfour states that in *Pristiurus* at his stage B, i.e., at the stage in which the involution to form the endoderm has just begun, the segmentation-cavity has completely disappeared, having become filled with an irregular network of cells.

The inflection of the blastoderm at the embryonic rim leads to the formation of a fold, the upper layer of which is ectoderm, the lower embryonic endoderm. The latter grows backwards along the entire posterior border of the blastoderm, but more rapidly along the middle line, the cavity below it giving rise to the archenteron (Fig. 7). As it extends backwards it apparently receives contributions of new cells from two sources; the greater number of the added cells are derived from the yolk-endoderm, but others are derived from the thin layer of cells which has been described above as lying below the roof of the segmentation-cavity. From the first the endoderm as it becomes formed assumes the character of an epithelium of vertically elongated cells.

The cavity below the endoderm (archenteron, gastrula-cavity) (Figs. 7 and 8, *ent.*) is a wide space which is bounded below only by the large-grained yolk with its protoplasmic network. Soon, however, its walls begin to curve inwards anteriorly, and

eventually meet below so as completely to enclose the archenteric canal in its anterior portion—the enclosure gradually extending backwards.

EXPLANATION OF FIGURES.

ant., anterior end of blastoderm.

ect., ectoderm.

*ect.*¹, superficial layer of cells distinguishable before the completion of segmentation.

end., endoderm.

*end.*¹, parablast endoderm.

ent., archenteron.

para., bed of fine-grained yolk with parablast nuclei.

Fig. 1.—Sagittal section of the blastoderm of *Heterodontus Phillipi* at a late stage of segmentation, showing the beginnings of the segmentation-cavity and the superficial layer.

Fig. 2.—Similar section of a somewhat later stage.

Fig. 3.—Stage with well-defined segmentation-cavity at the posterior end.

Fig. 4.—Somewhat later stage, in which the segmentation-cavity has become extended forwards and in which the first indication of the invagination is to be distinguished.

Fig. 5.—Later stage in which the involution has begun, and the rudiments of the parablast endoderm have become formed.

Fig. 6.—Stage in which the blastoderm has become considerably extended forwards and the parablast endoderm has become developed.

Fig. 7.—Similar section of a blastoderm in which the archenteron has become well established.

Fig. 8.—Transverse section of a blastoderm of a somewhat later stage, but before the first appearance of the notochord.

AUSTRALIAN LAND PLANARIANS: DESCRIPTIONS OF NEW SPECIES AND NOTES ON COLLECTING AND PRESERVING.

BY THOS. STEEL, F.L.S., F.C.S.

(Plates VI.-VII. figs. 5-8 and 10.)

PART I. DESCRIPTIONS OF NEW SPECIES, &c.

In 1887 Messrs. Fletcher and Hamilton contributed to this Society a valuable paper embodying their notes and observations on Land Planarians.* Since then the only further work of any note published in New South Wales is a paper by Professor Dendy on a collection made by me on the Blue Mountains.†

In Victoria Professor Spencer and Dr. (now Professor) Dendy, particularly the latter, have done excellent work in publishing descriptions with beautiful coloured plates, of the species found in that colony.‡ Dr. Dendy has also described some species from Tasmania and South Australia.§ Quite recently Prof. Dendy has published preliminary descriptions of New Zealand species.|| During the last few years I have been able to collect many species of our New South Wales planarians, as well as of those occurring in Victoria, and through the kindness of friends have received others from parts of the colony which I have not visited, as well as from Southern Queensland. Amongst these are a number of undescribed species, descriptions and figures of which I now desire to record in our Proceedings.

* P.L.S.N.S.W. (2 Ser.) Vol. ii. 349.

† *Loc. cit.* Vol. ix. 729.

‡ Trans. & Proc. R. S. Vict. 1889 to 1893.

§ Proc. R. S. Vict. 1893, p. 178, and Proc. Aust. Assoc. Adv. Science 1892, p. 369, and 1893, p. 420.

|| Trans. New Zealand Inst. xxvii. 177, and xxviii. 210; also Annals and Mag. Nat. Hist. (Ser. 6) Vol. xiv. 393.

GEOPLANA ATRATA, n.sp.

(Pl. VII. fig. 10.)

Dorsal surface intense black without any visible markings. Ventral surface, a pair of grey fairly well defined stripes bounding a median black stripe, and in turn bounded on the margins by the black ground colour. The median and paired stripes and marginal spaces of ventral surface about equal widths. A single row of large conspicuous eyes round anterior tip and for some mm. down the sides, but no side grouping could be traced, the eyes possibly being hidden by the dark pigmentation of the body. Pharyngeal aperture in spirit specimens between half and two-thirds from anterior end. Genital aperture not observed. Length 25 mm. by 1 mm. when crawling; same specimen in spirit 19 mm.

Type in Australian Museum, Sydney; register number G. 1509.

At first sight this planarian might readily be mistaken for a *Rhynchodemus*, but its generic identity is at once made sure by the numerous easily distinguished eyes. It is the darkest *Geoplana* with which I am acquainted.

Collected under logs by Mr. J. P. Hill, F.L.S., on Upper Manning River, N.S.W.

GEOPLANA HILLII, n.sp.

(Pl. VII. fig. 5.)

Dorsal surface bright sulphur-yellow, with two brown lines dividing it into three longitudinal areas of about equal width. At the anterior end the lines thicken and then coalesce, forming a brown tip which is in strong contrast to the yellow ground colour. Ventral surface paler yellow than the dorsal, fading to a nearly white watery-looking central longitudinal zone. Eyes numerous and readily seen, extending in a single row round anterior tip, with the usual side grouping, though somewhat sparse, a few mm. from the tip, and then in a single row down the sides and round the posterior end. Pharyngeal aperture in

spirit is midway between the ends, and the genital opening half way between the pharyngeal and the posterior end. Length of an ordinary specimen when crawling 70 mm. by 1 to $1\frac{1}{2}$ mm. in width. In spirit the yellow colour is completely dissolved out, leaving the worm white; the stripes are darkened somewhat at same time, probably by removal of the light yellow pigment. Occasional specimens are strongly tinged all over with green, giving them a peculiar yellow-green appearance.

I have also found specimens in which the brown lines fade out less than half way down the back, leaving the posterior half of the dorsal surface pale yellow. In no case have I seen any trace of a median dorsal line such as characterises *G. mediolineata*, Dendy.

The egg capsule is of chocolate-brown colour, about $2\frac{1}{2}$ to 3 mm. diam. One which I found early in February, 1897, and which hatched out immediately after, contained eight young ones, which were about 3 mm. in length. The eyes in these were plainly marked in a single row round the anterior tip and right down the sides. The brown colour of the tip and the dorsal lines for a short distance back were also visible; the body colour was pale yellow.

Type specimen in Australian Museum; register number G. 1510.

Hab.—Bundanoon, N.S.W.

This handsome planarian is exceedingly abundant at Bundanoon (Moss Vale District), and I have noticed large numbers of it during the last three summers.

I have pleasure in associating the name of my friend, Mr. J. P. Hill, F.L.S., with this species in recognition of his kindly assistance in collecting planarians for me.

GEOPLANA PONDEROSA, n.sp.

(Pl. vi. fig. 3.)

Ground colour of dorsal surface pale sulphur-yellow. A fairly large specimen in spirit has a median dorsal space of ground colour about 1 mm. in width, bounded on either side by a band

of about same width of speckled dark grey, well defined on its inner margin and diffuse on its outer. Next to this is another space of ground colour about $1\frac{1}{2}$ mm. wide, which again is bounded by a strong dorso-lateral sharply defined black band—dark brown in life—1 mm. in diameter. The margins round to the ventral surface are of the yellow ground colour. The sides bulge out a good deal, while the dorsal surface is very slightly arched, and the ventral quite flat, so that when the animal is crawling the surface is in close contact with the ground. Between the central bands and the lateral ones, and in the marginal space outside of these, the dorsal surface is sparingly peppered with minute dark brown punctations. At the anterior end all the bands blend into a brown tip, while at the posterior end the central space of ground colour continues right out, the marginal band on either side sweeping round and joining the corresponding inner band. The ventral surface uniform yellow, paler than the dorsal.

Eyes large and conspicuous, single row round anterior tip, not much side grouping, continued sparsely for some distance down the sides.

The specimen above described when alive and crawling was 250 mm. (10 inches) long by 6 mm. broad; in spirit it is 163 mm. ($6\frac{1}{2}$ inches) in length. The opening to the pharynx is 87 mm. from anterior end, and the genital opening 41 mm. behind that. Another spirit specimen 131 mm. long has the relative positions of the apertures, as above, 78 mm. and 28 mm. respectively.

Type specimen in Australian Museum; register number G. 1511.

Hab.—Bundanoon, N.S.W.

This is the most massive land planarian with which I have met. I have collected specimens of *G. variegata*, F. & H., almost as long as my largest finds of this species, but as a rule these are not nearly so thick in proportion to their length. It is readily distinguished from the allied form *G. variegata* by its yellow colour, the diffuse central bands and the narrowness and sharp definition of the dorso-lateral bands. In spirit the yellow colour dissolves, leaving the body nearly white, but without altering the bands, save to slightly darken them.

Like *G. variegata* this is an exceedingly sticky planarian, the slime with which the body is coated being extremely tenacious and plentiful. Both these species are very sluggish during the summer months—the only period when I have collected them—and appear to be aestivating, although other species are feeding freely.

GEOPLANA ROBUSTA, n.sp.

(Pl. VI. fig. 4.)

Ground colour of dorsal surface lemon-yellow. A pair of very bold sharply defined bands 1 mm. wide enclose a median space of ground colour also 1 mm. in width. The bands vary in colour from black to rich brown, their margins very dark, getting lighter towards the centre through the ground colour showing through faintly, and giving them a somewhat speckled appearance. Towards the ends the bands taper symmetrically to fine points which join near the tips. Along the margins of the dorsal surface there is a faint line of specklings of same colour as the main stripes. The anterior tip is rich brown. Ventral surface a somewhat paler shade of the same colour as the dorsal, without any markings. Length of average specimens in spirit 40 to 50 mm. by 4 mm. in diameter. In a spirit specimen 48 mm. long the pharyngeal opening is 28 mm. from anterior tip, and the genital 11 mm. further back. Another one 42 mm. has the former distance 27 mm. and the latter 7 mm.

Eyes large and readily seen, arranged as usual in single row round the anterior tip, and grouped, though somewhat sparingly, at the sides, continuing in a drawn out line for some way down the sides.

Type in Australian Museum; register number G. 1512.

Hab.—Bundanoon, N.S.W.

In shape this species resembles *G. Fletcheri*, Dendy, from which it is distinguished by the sharp definition of the stripes, together with the entire absence of any indication of a dorso-median line or of scattered specklings on dorsal surface.

Associated with the type I have noticed numbers of a most beautiful form in which the ground colour of both surfaces is a translucent pearly white, and the bands rich brown.

This is the only planarian which I have observed preying on other planarians. When collecting I found it necessary to put specimens of this species in a box by themselves, as they attacked and devoured such forms as *G. sanguinea*, *G. Hillii*, *G. quinque-lineata*, &c. I have seen this and other species feeding on earth worms as well as insects. On removing a planarian from an earth worm on which it was feeding, I observed a round hole or puncture in the skin of the earthworm into which the planarian had its oral organ inserted.

GEOPLANA ALBOLINEATA, n.sp.

(Pl. VII. fig. 8.)

The median dorsal line is pure white, about $\frac{1}{3}$ mm. in diameter, and is bounded on either side by a dark line of about twice its width. This line is grey-black on its inner side next the white line, and intense black on its outer edge. As it approaches the anterior tip it gradually assumes a rich chocolate-brown colour, the intense margin disappearing, and the whole merging into the tip which is brown. The margins of the dorsal surface are light sulphur-yellow. Ventral surface sulphur-yellow somewhat paler than that of the dorsal.

The eyes are conspicuous, and are arranged as in *G. Hillii* before described. In the specimens examined I did not detect any side grouping of the eyes.

The pharyngeal opening in spirit about midway between the ends, and the genital aperture rather less than half-way between this and the posterior end. A specimen alive at rest was 45 mm. in length by $1\frac{1}{2}$ mm. broad, and when crawling lengthened to 60 mm.

In section the body in life is very angular, forming almost a triangle, with the ventral surface for the base.

Type in Australian Museum; register number G. 1513.

Hab.—Bundanoon, N.S.W.; under logs in a shady gully; a somewhat scarce species.

The strong contrasts of white, black, yellow and brown make this little planarian very striking and handsome.

GEOPLANA QUINQUELINEATA, var. *ACCENTUATA*, var. nov.

(Plate VII. figs. 6-7.)

In their paper already mentioned, Messrs. Fletcher and Hamilton describe *G. quinquelineata* from a series of specimens collected in various parts of New South Wales, and at Sandhurst, Victoria. From their description it is evident that the type of the species has the median dorsal line, if anything, rather less decided than the lateral and marginal ones. In the note at the end of their description, special mention is made of the Victorian specimens and some of the New South Wales ones having the median line more strongly coloured than the others, and it is indicated that they expected at least varietal differences to be established when larger suites of specimens came to be examined.

I have been able to study a large series of specimens of this species from the Blue Mountains and Bundanoon in New South Wales, and from a considerable number of localities in Victoria, as well as from the Nerang River, Queensland. Without exception all my Queensland and Victorian specimens have the median dorsal line much accentuated and darker in colour than the other lines, while all my New South Wales ones have no such distinction, the median line being usually the least strongly marked of all. A number of specimens from various parts of Victoria, identified by Dr. Dendy as belonging to this species, and given to me by him, also agree in every way with my own specimens from that colony.

Mr. Fletcher has, with me, compared my specimens with those collected by Mr. Hamilton and himself, and we are agreed that the form having the dark median line should be considered as a variety of *G. quinquelineata*, the form with the uniform slender lines being regarded as the type of the species.

The new variety is readily distinguished from the species by the bold dark median line. After keeping in spirit for some time

the distinction becomes even more strongly marked, in some specimens the lateral and marginal lines having almost vanished by bleaching, while the median one remains strong and conspicuous.

So far as my own observation goes the species is confined to New South Wales, while all the specimens from Victoria or Queensland which I have seen belong to the variety.

The eyes are very numerous, and in well preserved specimens are conspicuous and readily seen. Round the anterior tip in a single row as usual, thickly grouped, a few mm. behind the tip, at which part they extend on to the dorsal surface as far as to encroach on the lateral stripes. An irregular wavy line of eyes extends along the sides to the extreme posterior end.

Type specimen in Australian Museum; register number G. 1514.

In a paper published in 1891,* Professor Spencer describes and figures a planarian from the Upper Yarra, Victoria, as a variety of *G. mediolineata*, Dendy, coming between that species and *G. quinquelineata*, F. & H. I am of the opinion that this specimen is a somewhat abnormal example of the present variety.

For the following species from Southern Queensland sent to me, some alive and some in an excellently preserved state, I have to thank my brother, Mr. John S. Steel, whose descriptive notes on the living worms have been most useful to me.

GEOPLANA ELEGANS, n.sp.

(Pl. VI. fig. 2.)

In the median line of the dorsal surface in a specimen of ordinary size is a bold sharp pale brown band, about $\frac{3}{4}$ mm. broad, extending from tip to tip. In the centre of this band there is a very narrow line of pure white running its length in the centre. On either side of the median line a broad band of dark brown, varying to dark olive, broadest in the

* Proc. R. S. Victoria, 1891, pp. 86 and 93, Pl. 12, fig. 15.

middle, where it is rather more than twice the width of the median line and tapering gently to each end. The outer margin of this band is of a much darker tint than the remainder of it. The remaining space to the margin of the body, nearly as wide as the broad band just described, corresponds in tint with the median space, and close to its outer margin is a fine line composed of specklings of same colour as the broad bands. On either side of this line there is frequently a still finer faint line likewise composed of specklings, which specklings may be more or less diffused over the marginal surface.

The ventral surface has a middle space of pearly white, corresponding to the ambulacral zone of *Bipalium Kewense*, rather more than 1 mm. wide at the centre and tapering to the ends. In this zone are situated the external apertures. Between the white central zone and the margins is uniformly speckled with brown, the edges of the bands so formed being delicately pencilled out by the specklings crowding together. The intermediate specklings are frequently arranged to form a series of longitudinal interrupted lines.

Eyes numerous and conspicuous, forming a single row round the anterior tip, extensively and densely grouped on the sides close to the tip and extending backwards in a single row for a few mm., the side grouping extending upwards almost to the dorso-lateral bands.

Pharyngeal aperture midway between the ends, and genital opening again midway between that and the posterior end. Both apertures are very conspicuous.

In spirit, a fair sized specimen 38 mm. long by 5 mm. wide. Another medium specimen 32 mm. by 4 mm.

Type in Australian Museum; register number G. 1515.

Hab.—Nerang River, Southern Queensland (Mr. John S. Steel).

In general shape this species resembles *G. Fletcheri*, Dendy, but does not taper so abruptly to the posterior end. It is a very handsome and distinct species and was found by Mr. John S. Steel fairly common under logs on the Nerang River, Southern Queensland.

GEOPLANA PARVA, n.sp.

(Pl. VI. fig. 1.)

The dorsal surface has in the middle a tapering band of yellow, in the median line of which is a very narrow but strongly marked line of dark brown. The yellow band tapers off towards the anterior extremity and comes to a fine point about 2 mm. from the tip, but extends quite out to the posterior end.

The space on either side of the yellow band right to the margins, and also round the anterior tip, is of a rich chocolate brown, darkest on its inner margin. This area thus forms a pair of broad marginal stripes. Close inspection shows that these bands are really covered with close stippings of brown, the yellow body colour showing through. Towards the outer margins the stippings are thinner and the surface has there a mottled appearance of mixed yellow and brown.

On the ventral surface there is a median white space corresponding in position and dimensions with the dorsal yellow band, in which, as in the previous species, the external apertures are situated. The marginal area on either side of the clear space is thickly speckled with light brown spots. These spots are well defined and distinct, not running into one another to form stippings.

Eyes conspicuous, arranged as usual in a single row round the anterior tip, thickly grouped a short distance back, the grouping extending well up on the brown bands nearly to the margin of the median yellow area; any continuation of the eyes backwards was not observed more than a few mm. from the grouping.

The pharyngeal aperture is about the centre of the ventral surface, and the genital opening midway between this and the posterior end; both apertures conspicuous.

Length in spirit 15 mm. by $2\frac{1}{2}$ mm. at widest part.

In shape exactly resembling *G. elegans* before described, but much smaller in size.

Type in Australian Museum; register number G. 1516.

Hab.—Nerang River, Southern Queensland (Mr. John S. Steel).

This beautiful little planarian in general appearance resembles small specimens of *G. elegans*, but is at once distinguished by the dorso-median narrow brown line and by the spotted nature of the markings on the ventral surface. It appears to be the smallest Australian land planarian yet described, the next smallest being *G. minor*, Dendy,* from Burnett River and Cooran, Queensland, the length of which is given by Dr. Dendy as 18 mm., while the present species is just 15 mm., both measurements being of spirit specimens.

G. parva is apparently a scarce species, as only two individuals, both of the same dimensions, were found by the collector—Mr. John S. Steel—after a prolonged search.

RHYNCHODEMUS GUTTATUS, F. & H.

Rhynchodemus guttatus, Fletcher and Hamilton, Proc. Linn. Soc. N.S.W. (Ser. 2), Vol. ii. p. 373; *Rhynchodemus Victorice*, var. *Steelii*, Dendy, Proc. Linn. Soc. N.S.W. (Ser. 2), Vol. ix. p. 733.

Mr. Dendy named this variety from specimens collected by the writer on the Blue Mountains, N.S.W. Through the courtesy of Mr Fletcher, I have been able to compare some of the specimens with which I supplied Dr. Dendy with the original types of Messrs. Fletcher and Hamilton; and Mr. Fletcher and myself are agreed that they are identical. Such being the case, I have thought it well to take the first opportunity of recording this correction. When Messrs. Fletcher and Hamilton described the species, curiously enough the two specimens which they had chanced to be what appears to be a somewhat uncommon form, having spots on the ventral surface. Since then these gentlemen have got a number of further specimens, and I also have collected a good series from the Blue Mountains and Bundanoon, N.S.W.; and from an examination of all these it is evident that they are one and the same species, which was originally described as *R. guttatus*, F. and H. The spots in the first specimens are evidently

* Proc. R. S. Vict. 1892, p. 125.

a minor character, for the specimens agree exactly in every other respect.

Typical specimens in Australian Museum; register number G. 1532.

During my study of the land planarian worms, I have experienced the greatest trouble in clearing up doubtful points of identity owing to the published descriptions being in many cases quite inadequate, and the types not being available for reference. With a view to doing what I can to obviate this state of matters for future students, I have deposited in the Australian Museum, Sydney, the types of all the species described in this paper. I have further placed in the same institution as complete a set as I am able of typical specimens of previously described Australian forms, which I hope to supplement from time to time, and I would appeal to naturalists whenever possible to follow a similar course. I am also sending a similar series to the British Museum of Natural History in order to supplement the collection already placed there by other workers in Australia.

Part ii.—COLLECTION AND PRESERVATION.

It will be unnecessary for me to say anything about the situations in which land planarians are to be met with, as this matter has already been fully dealt with by Messrs. Fletcher and Hamilton, and by Professors Dendy and Spencer in their various papers. When collecting I usually carry a few small tin boxes or wide-mouthed bottles, the covers or corks of which fit fairly close but are readily removed. Into these I put some fresh green leaves or damp moss, which permits of the worms being carried for considerable distances without injury. During very hot weather I have found it a good plan to carry the boxes in a little wallet, each box being wrapped in a cotton rag kept moist with water. By keeping the boxes cool, this prevents the destruction of the worms by the heat.

In cool weather no such precautions are necessary, and I have kept the animals alive amongst damp moss in a cool place for weeks at a time. Planarians are creatures which cannot be

advantageously preserved by putting at once into spirit, so that at all times it is desirable for the collector to take them home alive.

When such soft-bodied creatures are to be preserved it is necessary to use some fluid medium such as alcohol, for they cannot be dried without destroying all recognisable characters. If put direct into spirit, many planarians break into fragments owing to the forcible contraction induced, or become twisted or curled so as to render their future examination a matter of some difficulty.

Again, they are all more or less covered with a slimy secretion, which, being coagulated by the spirit, forms a white opaque coating adhering tenaciously to the surface of the animal, and so effectually masking the characteristic bands and markings as to frequently render identification difficult or uncertain, besides usually completely obscuring the eyes.

In preserving these worms—and I may here state that earth-worms may be advantageously treated in precisely the same manner—I first of all kill them with very weak spirit. The strength which I prefer is 1 of ordinary methylated spirit to 15 or 20 of water.

The worms are simply dropped into this weak spirit contained in a shallow dish, and die in about 10 or 15 minutes without the slime becoming coagulated or the worm breaking into pieces. I now take them up one at a time by means of a pair of weak-springed flat-bladed forceps, and with the aid of my wetted fingers gently draw the blades of the forceps along the worm's body, slightly compressing the body between them, and in this way scrape off the slime, wiping the forceps on a piece of rag. With a little care this can be done readily and safely even with the most delicate planarians, and leaves them beautifully clean and free from the objectionable slime. It is necessary to keep the fingers moist, otherwise the worm will stick and become damaged.

Having the strong spirit (80 to 85 per cent.) in another shallow dish, the worm is gently laid in it and by means of fingers and forceps flattened and straightened out and prevented from

shrinking too much as the spirit hardens it. A few minutes suffices for this, and it is now left while the others are being similarly treated. When all are finished they are transferred, with strong spirit, to the tubes or bottles in which they are to be preserved.

The great drawback to the use of spirit in preserving these worms is the solubility of the colouring matter of many of them in that menstruum.

The beautiful yellow and green tints are completely removed, leaving the previously elegantly coloured parts bleached and white, the spirit meantime becoming yellow.

Fortunately the colours soluble in spirit are usually confined to the areas of body colour; the characteristic bands, lines, &c., being of a dark pigment which is but slightly affected thereby. I have made numerous experiments with the view to preserve land planarians in their natural colours. It is necessary to use some medium which, while capable of preserving the animals, does not dissolve or destroy the colour. I have tried a large number of substances, such as different strengths of Formaline, alone and combined with spirit. various saline solutions, &c., and though I have failed to discover a medium entirely to my satisfaction, it is perhaps as well to record such amount of success as I have had. The preservative which I have found to answer best of all is chloroform. So far as preserving the colours is concerned it answers perfectly, but its high specific gravity—causing specimens to float—and its volatility, are somewhat serious objections. Common kerosene is another medium which, while not so efficient as chloroform, gives a very good retention of colour.

Before putting into either chloroform or kerosene, it is necessary to harden the specimen a little in strong spirit, the action of this being to displace water from the tissues.

The worms are killed and cleaned as already described and then put in strong spirit until the colour is seen to just begin tinging the spirit. Each specimen is laid for a moment on a piece of blotting paper to remove surplus spirit, and then put direct into the chloroform or kerosene.

As the planarians remain rather limp and sticky, and consequently difficult to handle, and to prevent from adhering to one another, it is perhaps best to lower them vertically into the empty dry tube or bottle, and to press them gently against the side. They will then adhere, and when all are in the preserving medium may be poured in. Alcohol and kerosene do not mix, and though with small specimens the kerosene appears able to displace the spirit, this is not the case with large bulky planarians. When such are being dealt with—and indeed in all cases—it is well to submit them to a preliminary soaking in chloroform after taking out of the spirit used for hardening. Chloroform is miscible with both spirit and kerosene, and so effects the thorough displacement of the former by the latter. An objection to kerosene is its general messiness and tendency to soak out through the cork. This latter propensity can be overcome by making use of good corks and varnishing them all over with strong shellac in spirit, allowing to dry thoroughly before using.

I have further made a few trials with kerosene for preserving such objects as the common green Cicada, Phasmids, &c., which in spirit become of an ugly red colour, and I find it, when properly used, to answer very well, causing them to retain their natural green colour. The specimens which I exhibit have been preserved for about five months.

Insects, spiders, &c., which it is desired to preserve in kerosene should have the body slit open and soaked in strong spirit in order to displace the water from the tissues, which would otherwise decay; they are then transferred to chloroform, in which they may be left indefinitely, being finally transferred to kerosene.

In one of his recent Annual Reports, Mr. A. Haly, Curator of the Colombo Museum, gives an account of some trials of carbolised oil for preserving in their natural shape and colour various vertebrates, such as fish, frogs, snakes, lizards, &c., and also crustaceans and spiders.

I have made a few trials with this medium, and find that it preserves the colours of land planarians excellently, the extremely

fugitive tints of such forms as *Geoplana sanguinea* and *G. Hillii*, being retained almost perfectly. At present I have in hand a series of experiments for the purpose of finding the best method of applying this preservative to general natural history specimens, and should I arrive at any results of value I propose at a future time to communicate them to the Society.

It should be borne in mind that no preserving medium will prevent the bleaching of any of these objects by light, and it is necessary with land planarians as with the others to keep them as much as possible in darkness, or at least away from strong light.

EXPLANATION OF PLATES.

Plate VI.

- Fig. 1.—*Geoplana parva*.
Fig. 2.—*Geoplana elegans*.
Fig. 3.—*Geoplana ponderosa*.
Fig. 4.—*Geoplana robusta*.

Plate VII.

- Fig. 5.—*Geoplana Hillii*.
Fig. 6.—*Geoplana quinquelineata*.
Fig. 7.— „ „ var. *arcentuata*.
Fig. 8.—*Geoplana albolineata*,
Fig. 10.—*Geoplana atrata*.

LAND PLANARIANS FROM FIJI, WITH DESCRIPTIONS OF NEW SPECIES.

BY THOS. STEEL, F.L.S., F.C.S.

(Plate VII., figs. 9 and 11.)

Some time ago I received from my brother, Mr. F. W. Steel, a small collection of planarians, comprising three species, which he made on the Navua River, Viti Levu. Two of these proved to be undescribed, and are, so far as I am aware, the first recorded apparently indigenous planarians from Fiji.

BIPALIUM KEWENSE, Moseley.

This interesting worm was found common under logs on the Navua River.

GEOPLANA TRIFASCIATA, n.sp.

(Pl. vii., fig. 9.)

The following description refers to spirit preserved specimens:—In median dorsal line a bold broad band of very dark brown running from tip to tip. Close to the margin on either side another similar band not quite so wide as the median one, the space between the median and marginal bands being nearly white and of about the same width as the median band. Ventral surface white, with a dim band of same colour as the dorsal ones close to each margin.

A single row of eyes round anterior tip and down each side for at least half way. No grouping of eyes could be traced in the specimens at my disposal. The pharyngeal aperture about one-third from anterior end. Position of genital opening not clearly made out, but apparently about midway between the other and the posterior end.

Length in spirit 13 mm. by $2\frac{1}{2}$ mm. broad.

Type in Australian Museum, Sydney; register number G. 1517.

Hab.—Navua River, Viti Levu, Fiji. In a compost heap made up of sugar-mill refuse. (Mr. F. W. Steel.)

This very small species was found burrowing in a heap of compost, which seems rather a curious habitat for a planarian. It is remarkable as being still smaller than *G. parva*, mihi, from Queensland, and in being, Mr. Fletcher informs me, the first *Geoplana* described from any of the South Pacific Islands.

RHYNCHODEMUS SCRIPTUS, n.sp.

(Pl. VII., fig. 11.)

Description of spirit preserved specimens:—The ground colour of the dorsal surface a very pale shade of brown. Anterior tip dark brown, running into a bold band on either side, which quickly diffuses backward into a marginal line composed of minute crooked and branching stipplings or marks. These lines continue down the margins, rather plainly defined until they coalesce at the hinder extremity, starting just behind the meeting of the bold brown bands; at the anterior tip there is a similar pair of dorso-medial bands; these start from a common point and run backwards to near the posterior end where they join, thus enclosing a median space of ground colour. Like the marginal bands, the dorso-medial ones are composed of minute irregular markings which, under the microscope, somewhat resemble Oriental written characters. Towards the anterior end of the bands these markings are somewhat crowded together and of darker colour, making this part more strongly marked. In colour the markings composing these bands vary from pale rufous to very dark brown. The central and intermediate spaces of ground colour are lightly speckled with markings similar to those composing the bands. In some specimens the medial bands tend to coalesce inwards to form a very broad, sparse, exceedingly irregular band.

Ventral surface somewhat irregularly peppered with speckles similar to those on dorsal surface, which are usually more or less

grouped to form an ill-defined pair of longitudinal lines near the margins and running from tip to tip.

Eyes two, situated as usual near the front end. Owing to the specimens being much curled and broken I could not satisfy myself as to the relative positions of the apertures, but so far as I could make out the pharynx is situated about the centre of the body, and the genital aperture midway between that and the hinder end.

Length of one specimen about 25 mm. by 3 mm. broad; another 22 mm. by 2 mm.

Type in Australian Museum; register number G. 1518.

Hab.—Navua River, Viti Levu, Fiji. Found in same situation as, and associated with, preceding species. (Mr. F. W. Steel.)

This worm bears a strong resemblance in general appearance to (though considerably smaller) *R. dubius*, Spencer, from Lord Howe Island†. It is distinguished by the arrangement and structure of the dorsal markings and by the presence of the ventral lines.

EXPLANATION OF FIGURES.

Plate VII.

Fig. 9.—*Geoplana trifasciata*.

Fig. 11.—*Rhynchodemus scriptus*.

† Trans. R.S. Vict. 1891, p. 48.

DESCRIPTION OF A NEW SPECIES OF LAND SHELL.

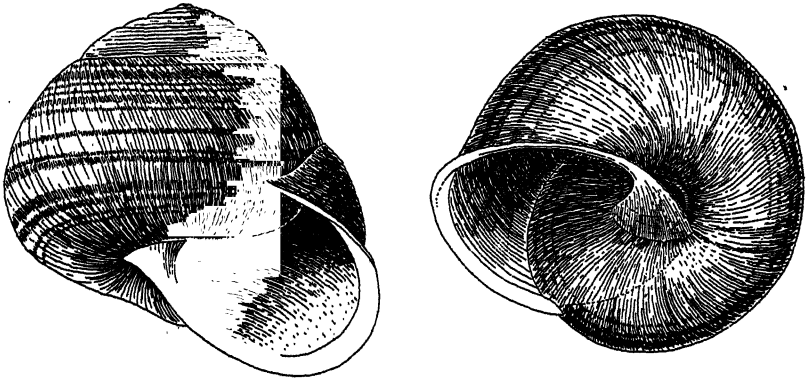
By C. E. BEDDOME.

HELIX (HADRA) YEPPOONENSIS.

Shell umbilicated, globose-conoidal, light buff colour, with numerous narrow bands of chestnut, visibly striated, which goes deep into the umbilicus, spire conical, apex obtuse, whorls $6\frac{1}{2}$, aperture oblique, white, livid white on the reflected lip, apertures connected with a shiny callus.

Alt. 34, diam. 36 mill.

Hab.—Yeppoon, near Rockhampton, Queensland.



About one third larger than natural size. From an authentic specimen (not the type). C. Hedley, del.

I have a var., of a dark chestnut colour, made by the chestnut lines being more numerous, extended to the base of shell, and into the aperture.

Near to *H. Mosmani*, Brazier. in its markings, but differs in being umbilicated, and white-lipped.

The type specimens are in my collection.

NOTES AND EXHIBITS.

Mr. Fred. Turner sent for exhibition, and communicated Notes upon, specimens of "Milk-bush" (*Sarcostemma australe*, R.Br.), and "Hop Plant" (*Daviesia latifolia*, R.Br.). The former as a fodder plant of very considerable merit has lately come prominently into notice in Western Australia, especially in very dry seasons. A decoction of the leaves of the latter is reported to have cured a case of hydatids in the Upper Murray District, Victoria, particulars of which were given. [For other references to these two plants, see Journal of the Bureau of Agriculture, Perth, W.A., Vol. iv. No. 3 (Feb. 10th, 1897), p. 1150; and Papers and Proc. Royal Society of Tasmania, 1890, p. xi.]

Mr. North sent for exhibition the eggs described in his paper.

Mr. W. W. Froggatt exhibited specimens of the so-called Queensland Fruit Fly (*Halterophora capitata*, Wied., sp.) in the pupal, larval, and perfect forms, together with some apples from Inverell, N.S.W., showing how these are affected by the attacks of this destructive pest which has been reported from the northern parts of New South Wales as well as from Gosford and Penrith. Also specimens of potatoes from Colo Vale, attacked by white ants (*Termites* sp.) while in the ground before being dug up.

Mr. T. Steel exhibited a fine collection of well-preserved and displayed Land Planarians, representing the species described in his paper, and illustrating the modes of preservation and the results after the use of the various preservative media advocated therein.

Mr. Steel also contributed the following

Note on Peripatus.

"I desire to place on record the occurrence in New South Wales of *P. oviparus*, Dendy, the Victorian form of *Peripatus*. While

collecting in January of this year, between Exeter and Bundanoon (Moss Vale District), on turning over a log I noticed a *Peripatus* which from its attitude and general appearance specially attracted my attention. This proved to be a female specimen of the above species, and, so far as I am aware, this is the first occasion on which its occurrence in this colony has been definitely recorded. The lozenge-shaped pattern which characterises most of the specimens found in Victoria is well displayed; and the fact of the ovipositor being fully extruded in the specimen, which I now exhibit, is sufficient guarantee of its identity. When visiting the Australian Museum a few days ago I had an opportunity of examining the specimens of *Peripatus* preserved there, and I was interested in noticing that those collected by Mr. Helms in 1889 at Mt. Kosciusko belong to the same species. All of the females in the Museum collection from that locality, which I examined, have the ovipositor plainly visible, and in many of them it is fully extruded."

WEDNESDAY, MAY 26TH, 1897.

The Ordinary Monthly Meeting of the Society was held at the Linnean Hall, Ithaca Road, Elizabeth Bay, on Wednesday evening, May 26th, 1897.

Professor J. T. Wilson, M.B., President, in the Chair.

Mr. Gerald H. Halligan, "Riversleigh," Hunter's Hill, was elected a Member of the Society.

DONATIONS.

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NOTES UPON THE *FORMICIDÆ* OF MACKAY, QUEENSLAND.

BY GILBERT TURNER.

I have been induced to record these notes, made while collecting ants from their nests, and observing them at large in the vicinity of my home (about fifteen miles west of the town) in the hope that they may be of interest to entomologists who are not so favourably situated, or who only know the species from cabinet collections.

I am enabled to do this through the kindness of Professor Aug. Forel, of Zurich, who has identified my specimens, described some of the new species, and given me a great deal of information about the distribution and habits of Ants in other countries.

To give some idea of the richness of ant life in this district I append a list of 140 species collected, many of which are common.

This part of the country is divisible into "forest," that is is grass land more or less thickly timbered, the prevailing trees on which are some half-dozen species of eucalypts: and "scrub," which only occurs on the hills, and in narrow belts along the watercourses; no grass grows upon this sort of country, which is very thickly timbered, and is sometimes almost impenetrable from the abundance of vines and climbing plants.

Ants are far more numerous in the forest than they are in the scrub lands, because in the former those species which frequent the ground can get an abundance of light and sunshine in which to air their pupæ, whereas in the latter the foliage of the trees forms such a dense shade, that very little direct sunshine can reach the ground or indeed penetrate beyond the tangled foliage above. It is remarkable how very few species frequent the trees in the scrub, but this is probably owing to the great numbers of

the savage little green tree ant, *Ecophylla smaragdina*, Fab., var. *virescens*, Fab., which attacks everything that comes in its way.

These ants build nests by drawing the leaves together with a web, forming the tip of a branch into an irregular rounded mass often over a foot in diameter and partitioned off into irregular cells or chambers among the enclosed leaves. These nests are constructed in the tops of the smaller scrub trees or undergrowth, and might at first sight be taken for immense spider nests. They swarm with ants, and it is a common incident when pushing one's way through the creepers to tear one of their nests and have a swarm of these savage little creatures come tumbling down on one's head, and where an ant falls he hangs on with his long sharp jaws, and each has to be picked off before one is rid of them. They range from Mackay to the New Guinea scrubs, if not further,* and are the pirates of the tropical scrubs, destroying an immense number of insects. The wild bees forming "honey bags" in the tree trunks protect the entrance to their nests with a funnel-like rim of propolis to keep them out; but if this rim gets damaged the cunning little ants will crawl upon the broken edge and pick off each bee as it comes out; and it is wonderful that any insects live in scrub in which the ants are so numerous.

So far as my knowledge at present extends, about twenty species are confined to the scrub, though only twelve of these can be said to be strictly scrub species; the others having been found so rarely as to make it a matter of doubt whether with extended research they might not occur also in the forest. Although the line of demarcation between the forest and scrub is nearly always sharply defined, yet this is not always the case with the range of the different species of ants; *Ecophylla smaragdina* even occasionally encroaching but never very far, into the forest country, while there is one forest ant frequently ranging a short distance into the scrub. This naturally makes it difficult to determine to which class of country a species belongs when it is rare and only found at the junction of the scrub and forest.

* The typical *Ec. smaragdina* found in India is of a yellow colour. Other species are found in Africa.

Stony pockets of forest land running up into the scrub, and stony ridges near the jungle seem to be most favoured by the ants; the land in these places is usually poor and thinly covered with grass, and every log or stone protects one or more of their nests; this land is drier than the surrounding country and is seldom visited by an animal larger than a wallaby, which keeps to its beaten track, so that the ant-nests are seldom disturbed.

Among the larger ants *Camponotus novæ-hollandiæ*, Mayr, *Leptomyrmex erythrocephalus*, Fab., and *Myrmecia nigrocincta*, Mayr, are very plentiful, and appear to be about equally distributed in both the forest and the scrub, and the same may be said of one or two of the smaller species.

A fact worth mentioning in connection with this point is, that of three species, *Polyrhachis lævior*, Rog., *Pheidole proxima*, Mayr, and an undescribed *Cremastogaster*, which I have only found in the forest, there are new varieties or races which are only found in the scrub. Another species, *Pheidole variabilis*, Mayr, common in the forest, always forms its nest on the ground under logs or stones, but there is a new variety of this species found both in the scrub and forest which always builds its nest in cavities in living trees, or in rotten timber lying on the ground; this is the only species of this genus that in this district does not make its nest on the ground.

Out of twelve species confined to the scrub, Professor Forel determined seven to be new; two others new varieties of described species, the typical forms of which have not yet been found here; two species have not yet been determined, and the remaining one is the widely distributed *Ecophylla smaragdina*. It is therefore evident that the scrub has hitherto not been so closely hunted over by collectors as the forest, and even with my opportunities for collecting in it, I know that a great deal remains to be done in this class of country.

The genus *Camponotus* is represented by fifteen species, one of which when submitted to Professor Forel was found to be new, and another which had been wrongly named has since been described by him.*

* Ann. Soc. Ent. Belg. Vol. xxxix. 1895.

With the exception of two of these species that sometimes range into the scrub, all of them are confined to the forest lands; they usually make their nests in the ground under logs or stones, but some species, though naturally subterranean in their habits, sometimes depart from the general rule and construct their homes in hollow trees.

Camponotus intrepidus, Kirby, makes its nest in the ground, forming a conical mound about a foot in height and eighteen inches in diameter at the base; the earth is excavated from the galleries below, which form the main part of the nest, but the raised dome above it is full of irregular chambers in which numbers of males, females and pupæ as well as workers are living in the early summer. These ants seem to form colonies, as their nests are generally found in groups of two or three to sometimes a dozen within a radius of twenty yards.

I have only succeeded in obtaining a complete series of specimens of the following five species: the males and females of *Camponotus ceneopilosus*, Mayr, are plentiful in the nests in October and November; those of *C. novæ-hollandiæ*, Mayr, in the latter month, and those of *C. dorycus*, Sm., var. *confusus*, Em., *C. nigriceps*, Sm., and its variety *C. dimidiatus*, Rog., towards the end of December and January; but the time of the appearance of the sexes depends a good deal upon the season.

The genus *Polyrhachis* is represented by no less than twenty-five species, in addition to which there are some seven or eight varieties or races; many of the members of this genus are remarkable for the beauty of their colours and symmetrical form.

Among these Professor Forel found ten new species*, most of the varieties unknown. Another species, *Polyrhachis dives*, Sm., also identified by him, very common in tropical Asia, has been found by me for the first time in Australia.

This group of ants are both arboreal and terrestrial in their nesting habits; the nests of eleven species are always found in the ground, many of which are variable in their construction even in

* Ann. Soc. Ent. Belg. Vol. xxxix. 1895.

the same species, sometimes consisting simply of excavations in the ground under logs or stones, while at other times they form their galleries under a tuft of grass, covering it with a mound of earth a foot in height; sometimes the mound is composed of vegetable débris, particles of soil, &c., all held together very loosely by a kind of web, but the latter is a rare form.

The only nest of *Polyrhachis dives* found was formed somewhat in this manner, without any particles of soil, being built round a small tree, unconnected with the ground, and about three feet up the stem, some smaller branches and long blades of grass being enclosed. The whole nest was oval in form, measuring a foot in diameter. Another species (*Polyrhachis* sp. ?) covered in an angle in a rock with a nest composed of the same material covered with a similar web about six inches in diameter and almost circular, the exterior being slightly convex and only attached to the rock round the edge. The entrance to this nest was very remarkable; it was situated about two inches from the junction of the nest with the rock and protected by a short tube composed of the same kind of woody débris, raised half an inch above the surrounding surface of the nest, circular in form, and not more than quarter of an inch in diameter, but slightly enlarged where it entered the nest.

Two species, *Polyrhachis ornata*, Mayr, and *P. Daemeli*, Mayr, build their nests in rotten places in timber or under loose pieces of bark, but *P. lævior*, Rog., and *P. rastellata*, Latr., form their nests in the foliage by joining several leaves together with a web; where the edges of the leaves are not in contact, the intervening space is filled up by the web, which also lines the interior of the nest; sometimes they take a single large leaf and turning it over or even rolling it up longitudinally, form a small compact nest.

The nests of the other species have not been discovered, but as the specimens have been all captured upon the stems of trees, most of them may be presumed to be arboreal in their habits.

The males and females of this genus are most plentiful in October and November, but on more than one occasion I have found both sexes in the nests in August, and once found males in

May. The winged forms are hard to find, for only those of half the species in the district have been secured.

The genus *Myrmecia* is poorly represented in this district, only three species having been collected, of which only *M. nigrocincta*, Mayr, is common. This species constructs a rounded mound of earth over the nests, and at the least alarm they come rushing out one behind the other in light skirmishing order, in a series of jumps, and from their manner of progression are often called "jumpers"; they both bite and sting very severely. The entrance to the nest is generally on the side of the mound level with the ground about Sydney, but in Mackay it is always on the top; the excavations below were followed in one nest, from which males and females were obtained in October, to a depth of two feet without reaching the end.

The only other species, neither of which is common, and whose nests never contain many individuals, are *Myrmecia auriventris*, Mayr, and a variety of *M. piliventris*. The members of this genus, which is peculiar to Australia, are much better represented in the more arid and sandy portions of Southern and Central Australia than in the tropical regions.

The genus *Podomyrma* is well represented by some eight species, five of which were previously unknown, and some of which have since been described by Professor Forel. All these ants make their nests in cavities in the centre of living trees, the entrance to the nest being so small a hole that only one ant can pass in at a time, so that it is very difficult to locate the nest without careful observation.

Three species, *Podomyrma gratiosa*, Sm., *P. micans*, Mayr, and *P. striata*, Sm., are comparatively common, and until recently I believed that each species confined itself to a distinct species of tree, but my brother in a visit some twenty miles down the coast, where there is the same class of forest, found their nests in different kinds of timber. Where one nest is discovered there are frequently in the same tree several smaller distinct nests with separate openings that are probably offshoots from the original colony. In a nest of *P. striata* were found some curious coccids

about a quarter of an inch in diameter, firmly attached to the inner walls of the nest by a white substance.

Aphaenogaster longiceps, Sm., is a very common ant, and during the wet weather throws up mounds of about eight inches in diameter and rising to a height of three or four inches round the opening; they vary much in size and shape, and are most numerous where the grass is short, but from their loose construction are soon destroyed; it is usual in cloudy weather to see several workers on the top of the mound, but they hurry down the chamber when disturbed.

There is one species, *Leptomyrmex erythrocephalus*, Fabr., which can be described as a "honey ant," for certain workers in every nest have their abdomens greatly distended by a sweet, transparent fluid. These workers are only found at the bottom of the nest, about two feet from the surface; they can move about, but are not as active as the unaltered workers, and never leave the nest. I have occasionally found workers of two species of *Camponotus* and two of *Iridomyrmex* away from the nests with their abdomens slightly distended, but evidently only caused by a hearty meal.

One of our most extraordinary ants is *Odontomachus ruficeps*, Sm., var. *coriarius*, Mayr, a large insect measuring over half an inch in length, with very long jaws hooked at the tip and generally carried pointing straight out in front of the head; but when disturbed it opens them out until at right angles to the ordinary position on either side of the head, closing them quickly with a snap causing a clicking sound, which is evidently done to intimidate their enemies, as they do it only when frightened.

By way of experiment, a few of these ants were placed in a shallow cup about two inches deep, the sides of which sloped slightly to the rim, but too steep for the ants to climb, so they managed to get out in the following manner: opening their jaws to the fullest extent, they placed themselves head downwards with the body resting against the side of the cup, and suddenly closed their jaws with a snap, just as if a watch spring had been suddenly released, this action supplying enough impetus to not

only throw them backwards clean out of the cup but sometimes fully a foot beyond it. Wishing to see how they laid hold of anything, I let the end of a piece of string hang down into the cup, but they closed their jaws slowly in a somewhat aimless manner as if they did not understand escaping by this means.

The moment a nest of this species is disturbed, the workers come rushing out, making a curious squeaking noise quite distinct from the sound caused when the jaws snap together. This is the only ant that I have come across that emits a true sound audible to the human ear, but as yet I have not been able to ascertain how this sound is produced.

Parasitic hymenoptera (Family *Chalcididæ*) are sometimes met with in ants' nests; once when breaking up a rotten log containing a nest of *Pheidole variabilis*, Mayr, a fine specimen of *Eucharis* sp., just ready to emerge, was found among the ants. In another case, four ant pupæ enveloped in their silken cases were found in the nest of *Bothroponera mayri*, Em., and placed in a breeding bottle, where they remained from September to the middle of November, when a fine female chalcid of the genus *Rhipipallus* emerged from one, though it was not until three months later that the ants came out of the other three pupa cases.

Of the genus *Bothroponera* there are three or four large species which resemble each other very closely, and the individuals of which, when disturbed, discharge a white frothy substance from the anus; though when they sting, which they do pretty severely, they do not eject this frothy matter.

In collecting ants, spiders are frequently met with that not only closely resemble the ants among which they consort, both in form and colouration, but also in their mode of progression, so that it is only after their capture that their true affinities are revealed.

One spider takes to itself the appearance of a worker of *Leptomyrmex erythrocephalus*, Fabr., and curves its abdomen upwards and forwards until it rests on the top of the thorax, exactly the same as the ant; another bears a very strong resem-

blance to *Camponotus æneopilosus*, Mayr, while a third imitates the form of some of the species of the genus *Polyrhachis*, even to the golden pile upon the abdomen.

Since these spiders are only found in places where the ants that they resemble are also found, and as the latter are frequently found without the mimetic spiders, it is evident that it is the spiders which benefit from their striking resemblance to their hosts.

In concluding these notes, I would like it to be understood that they refer only to the *Formicidæ* collected in the immediate district, as under different conditions and surroundings it is very probable that the same species may vary both in the construction of the nest and the site chosen.

My thanks are due to Mr. W. W. Froggatt for notes and assistance in preparing this paper.

Appended is a list of species of ants collected in this district:—

FORMICIDÆ.

I. Subfamily CAMPONOTIDÆ.

Genus CAMPONOTUS.

1. *C. æneopilosus*, Mayr.
2. *C. albopilosus*, Mayr.
3. *C. arcuatus*, Mayr.
4. *C. claripes*, Mayr.
5. *C. dorycus*, Sm., var. *confusus*, Em.
6. *C. extensus*, Mayr.
7. *C. intrepidus*, Kirby.
8. *C. Janeti*, Forel.
9. *C. Lownei*, Forel (= *nitidus*, Lowne, nec Norton, nec Smith).
10. *C. nigriceps*, Sm.
 ,, var. *dimidiatus*, Rog.
11. *C. novæ-hollandiæ*, Mayr.
12. *C. reticulatus*, Rog., var. *Yerburyi*, Forel, var.
13. *C. subnitidus*, Mayr.

14. *C. suffusus*, Sm.
15. *C. vitreus*, Sm.

Genus COLOBOPSIS.

16. *C. rufifrons*, Sm., var. *semicarinata*, Forel.

Genus POLYRHACHIS.

17. *P. ammon*, Fabr.
- " var. *angusta*, Forel.
18. *P. ammonoides*, Rog.
19. *P. appendiculata*, Em. (race undescribed).
20. *P. daemeli*, Mayr.
- " " (race undescribed).
21. *P. dives*, Sm.
22. *P. Guérini*, Rog.
23. *P. Heinlethii*, Forel.
24. *P. Hookeri*, Lowne.
- " " var. *lownei*, Forel.
- " " var. *obscura*, Forel.
25. *P. lævior*, Rog.
- " " (race undescribed).
26. *P. micans*, Mayr.
27. *P. ornata*, Mayr.
- " " (race undescribed).
28. *P. Penelope*, Forel.
29. *P. punctiventris*, Mayr.
30. *P. rastellata*, Latr.
31. *P. semiaurata*, Mayr.
32. *P. Schenki*, Forel (two races undescribed).
33. *P. trapezoides*, Mayr.
34. *P. Turneri*, Forel.
- 35-41. Undescribed species.

Genus ECHINOPLA.

42. One undescribed species.

Genus OPISTHOPSIS.

43. *O. respiciens*, Sm.
 44. One undescribed species.

Genus ŒCOPHYLLA.

45. *Œ. smaragdina*, Fabr., var. *virescens*, Fabr.

Genus LEPTOMYRMEX.

46. *L. erythrocephalus*, Fabr.

Genus NOTONCUS.

47. *N. Gilberti*, Forel.

Genus PRENOLEPIS.

48. *P. obscura*, Mayr.
 „ „ var. undescribed.

Genus PLAGIOLEPIS.

49. *P. exigua*, Forel (var. undescribed).

Genus ACROPYGA.

50. *A. moluccana*, Mayr (var. undescribed).

Genus MELOPHORUS.

51. *M. æneovirens*, Lowne.
 52-55. Four undescribed species.

II. Subfamily DOLICHODERIDÆ.

Genus DOLICHODERUS.

56. *D. Doriae*, Em.
 57. *D. scrobiculatus*, Mayr.
 58. One undescribed species and one undescribed var.

Genus TAPINOMA.

59. *T. minutum*, Mayr.
 „ „ (var. undescribed).

Genus TECHNOMYRMEX.

- 60-61. Two undescribed species.

Genus TURNERIA.

62. *T. bidentata*, Forel.

Genus IRIDOMYRMEX.

63. *I. glaber*, Mayr.
64. *I. gracilis*, Lowne.
" " (race undescribed).
65. *I. itinerans*, Lowne (race undescribed).
66. *I. nitidus*, Mayr.
67. *I. rufoniger*, Lowne.
" " (var. undescribed).
68. One undescribed species.

Genus BOTHRIOMYRMEX.

69. *B. pusillus*, Mayr.

Genus PLATYTHYREA.

70. *P. Turneri*, Forel.

III. Subfamily PONERIDÆ.

Genus ODONTOMACHUS.

71. *O. ruficeps*, Sm., var. *coriarius*, Mayr.

Genus ANOCHETUS.

72. *A. Graeffei*, Mayr.
73. One undescribed species.

Genus PONERA.

74. *P. lutea*, Mayr.
75. *P. melanaria*, Em. (var. undescribed).
76. *P. punctatissima*, Rog., var. *indifferens*, Forel.
77. *P. truncata*, Sm. (var. undescribed).
78. *P. trigona*, Mayr (var. undescribed).

Genus BOTHROPONERA.

79. *B. Mayri*, Em.
 80. *B. piliventris*, Sm.
 „ „ var. *minor*, Forel.
 81. *B. sublævis*, Em., var. *reticulata*, Forel.

Genus ECTATOMMA.

82. *E. convexum*, Mayr.
 83. *E. metallicum*, Sm.
 84. *E. (Acanthoponera) imbellis*, Em., var. *hilare*, Forel.
 85. *E. (Rhytidoponera) scabrum*, Mayr.
 86. One undescribed species.

Genus LOBOPELTA.

87. *L. conigera*, Mayr.
 88. *L. excisa*, Mayr.
 89-90. Two undescribed species.

Genus LEPTOGENYS.

91. One undescribed species.

Genus SYSCIA.

92. One undescribed species.

Genus SPHINCTOMYRMEX.

93. *S. Emeryi*, Forel, var. *myops*, Forel.
 94-95. Two undescribed species.

Genus LIOPONERA.

96. *L. longitarsus*, Mayr, var. *australis*, Forel.

Genus MYRMEDIA.

97. *M. auriventris*, Mayr.
 98. *M. nigrocincta*, Mayr.
 99. *M. piliventris*, Sm., var.

IV. Subfamily DORYLIDÆ.

Genus ÆNICTUS.

100. *Æ. bengalensis*, Mayr (race undescribed)
 101. One undescribed species.

V. Subfamily MYRMICIDÆ.

Genus SIMA.

102. *S. læviceps*, Sm.

Genus CARDIOCONDYLA.

103. *C. nuda*, Mayr.

Genus OLIGOMYRMEX.

104. One undescribed species.

Genus PHEIDOLE.

105. *P. brevicornis*, Mayr.
 106. *P. impressiceps*, Mayr.
 107. *P. longiceps*, Mayr.
 108. *P. proxima*, Mayr.
 " " (two vars.).
 109. *P. variabilis*, Mayr.
 " " var.
 110-111. Two undescribed species.
 112. One undetermined species

Genus TETRAMORIUM

113. *T. guineense*, Fabr.
 114. One undescribed species.

Genus LIOMYRMEX.

115. *L. (Machomyrma) dispar*, Forel.

Genus MONOMORIUM.

116. *M. pharaonis*, Linné.117. *M. vastator* ?

Genus DACRYON.

118. *D. omniparens*, Forel.

Genus APHÆNOGASTER.

119. *A. longiceps*, Sm.

Genus STRUMIGENYS.

120. *S. (Epopostruma) quadrispinosa*, Forel.121. *S. (Epopostruma) Turneri*, Forel.

Genus MYRMECINA.

122. One undescribed species.

Genus CREMASTOGASTER.

123. *C. fusca*, Mayr.124. *C. laeviceps*, Sm.125. *C. sordidula*, Nyl. (var. undescribed).

126-127. Two undescribed species.

One undescribed race.

Genus TRIGLYPHOTHRIX.

128. *T. obesa*, André, var. undescribed.

Genus PODOMYRMA.

129. *P. convergens*, Forel.130. *P. elongata*, Forel.131. *P. gratiosa*, Sm.

132. *P. micans*, Mayr.
133. *P. striata*, Sm.
134-136. Three undescribed species.

Genus *MERANOPLUS*.

137. *M. hirsutus*, Mayr.
 ,, ,, and var
138. *M. pubescens*, Sm., var. *fenestratus*, Sm.

DESCRIPTIONS OF TWO NEW SPECIES OF *CYPRÆA* FROM WESTERN AUSTRALIA.

BY AGNES F. KENYON.

CYPRÆA KAISERI, n.sp.

Shell more pyriform and elegantly shaped than in *C. pyriformis*, more attenuated at the anterior extremity; it is also smaller, with the back more raised; the dorsal surface cream-coloured, minutely freckled with light brown specks; base white, more convex than in *C. pyriformis*; the side spots smaller and of a darker brown; spire umbilicated; there is an absence of the end blotches present in both *C. pyriformis* and *C. smithi*, and it is altogether a more exquisitely shaped shell; columellar teeth 15, red as in *C. pyriformis*, those on the lip numbering 17, sharp and white; the anterior end is produced as in *C. pulchella*.

Long 21; greatest lateral breadth 13, smallest 4 mm.

Hab.—Lagrange Bay, Western Australia (A. F. Kenyon).

CYPRÆA WILHELMINA, n.sp.

Shell with the dorsal surface of a light cream colour, spotted with yellow, a few of the spots being ocellated; base ivory-white; columella with 17 teeth, rather obtuse; outer lip with 18, also possessing three smaller additional ones extending beyond the 18, inside the channel at the posterior extremity; anterior end slightly produced.

Long 18; lateral width 10 mm.

Hab.—Western Australia (A. F. Kenyon).

I have also a young specimen and three others from the same locality of a more ovate form, similar in shape and dentition to *C. poraria*, but as they have a cream-coloured, yellow-spotted dorsal surface, and the base ivory-white without the faintest tinge of purple, I should class them as slight varieties of *C. wilhelmina*.

NOTES FROM THE BOTANIC GARDENS, SYDNEY.

No. 1.

BY J. H. MAIDEN AND E. BETCHE.

(a). NOTES ON RARE PORT JACKSON PLANTS.

UMBELLIFERÆ.

SIEBERA STEPHENSONII, Benth.

Trachymene Stephensonii, Turcz. Collected in January, 1895, by Mr. W. W. Froggatt near Botany, and in January, 1897, by Mr. W. Forsyth (Overseer of the Centennial Park, and now a member of this Society), near La Perouse. It was previously specifically recorded only from Manly. (Also "within 125 miles of Sydney" in Bentham's *Flora Australiensis*).

COMPOSITÆ.

HELICHRYSUM ADNATUM, Benth.

Syn. *H. retusum*, F.v.M. (partim) F. v. Mueller, *Census*, also *Fragm.* viii. 46. Collected in November, 1890, by E. Betcher near Oatley, and in November, 1896, by Mr. J. Boorman near Hurstville. It is not recorded as a Port Jackson plant in Bentham's *Flora Australiensis*, nor in Dr. Woolls' "Plants Indigenous to the neighbourhood of Sydney," though "Port Jackson" (sometimes, however, a designation for a very wide geographical area, as used by the older botanical writers), is given as the habitat in De Candolle's *Prodromus*, Vol. vi. p. 166.

LEGUMINOSÆ.

ACACIA BAUERI, Benth.

Collected near Rose Bay in 1886, has been recently discovered by Mr. W. Forsyth in a second Sydney locality, the Centennial

Park. *Acacia Baueri* was originally described from specimens obtained from North Australia, and very few localities (including Richmond River and Hunter River) are recorded between the North Coast of Australia and Port Jackson.

GRAMINEÆ.

ERiachNE obtusa, R. Br.

Collected in May, 1897, by Mr. W. Forsyth near Rose Bay. It is an almost glabrous form, with no woolly hairs on the base of the stem as in the desert forms; the outer glumes are quite glabrous, and the hairs on the flowering glumes are shorter and more appressed than in the typical form. The species has been previously recorded only, as regards New South Wales, from the western districts, though it is found in Queensland near the coast.

The belt of low land extending from Rose Bay to the sandhills of Bondi from which *Acacia Baueri* and *Eriachne obtusa* have been obtained, is also the habitat of the rare *Dodonæa filifolia*, Hook., (already recorded as a Port Jackson plant in Moore & Betches *Handbook of the Flora of N.S. Wales*). It is a remarkable fact that these three northern plants have been found in such close proximity to each other, and this seems to indicate that they are the survivors of a time in which northern plants extended further south than at the present day.

Dodonæa filifolia was, previously to its discovery near Rose Bay, only recorded from Queensland, but it is closely allied to the Tasmanian *D. ericifolia*, G. Don, and the common ancestral form of the two species extended probably along the whole East coast of Australia, our Port Jackson plants being apparently the sole survivors in N.S. Wales and Victoria, and the connecting link between the Tasmanian *D. ericifolia* and the Queensland *D. filifolia*. The Port Jackson specimens are distinguished from Major Mitchell's, Dr. Leichhardt's, and other Queensland specimens in the Herbarium of the Botanic Gardens, by shorter, broader, more curved and crowded leaves, as well as by the shorter

peduncles, and approach the Tasmanian *D. ericifolia* so closely, that it becomes a matter of doubt and difficulty to decide to which of the two species they should be attributed. Bentham writes in 1863 in a footnote to the description of *D. ericifolia* in the *Flora Australiensis*:—"The station Port Jackson, usually given on the authority of plants raised in Kew Gardens is, I believe, erroneous; the seeds were probably from Fraser, who gathered the plant on S. Esk River in Tasmania."

It seems to us more likely that the supposed mistake did not occur, and that the Kew Gardens plants in question were raised from seeds really collected near Sydney, but determined at that time at Kew as *D. ericifolia*, so that the discovery of *D. filifolia* in the Port Jackson district may be only the rediscovery of a lost locality. Now, we are sorry to say, *D. filifolia* seems to be fast dying out in the Port Jackson district; hardly half a dozen plants could be found in 1896 in the same locality in which it abounded in 1883.

(b). PLANTS NEW FOR NEW SOUTH WALES.

LEGUMINOSÆ.

ACACIA ALPINA, F.v.M.

Summit of Mt. Tabletop, near Kiandra (E. Bêche, February, 1897). Previously recorded from alpine summits of Victoria. In addition to Mt. Tabletop it has been found on the top of two other mountains near Kiandra, always strictly confined to the wind-swept summit, where it forms dense patches, often more than ten feet in diameter and about two or three feet high.

It may be of interest to mention here that *Richea Gunnii*, Hook., first discovered in N.S. Wales as recently as 1893 by Mr. R. Helms on Mt. Kosciusko, is common in nearly all the swamps near Kiandra, an indication of how imperfectly the Kiandra district has been botanically explored.

COMPOSITÆ.

PTERIGERON DENTATIFOLIUS, F.v.M.

Olive Downs, Grey Range (W. Bäuerlen, 1886). Previously recorded from S. Australia.

ORCHIDEÆ.

GEODORUM PICTUM, Lindl.

Byron Bay (E. Betcher, March, 1896). The pseudobulbs were collected in a swampy forest, together with *Phajus grandifolius*, Lour., and *Calanthe veratrifolia*, R. Br., and flowered under cultivation in the Botanic Gardens, Sydney, in January, 1897. Previously recorded from Queensland and North Australia.

DESCRIPTIONS OF THREE NEW SPECIES OF AUSTRALIAN PLANTS.

By J. H. MAIDEN AND E. BETCHE.

SAPINDACEÆ.

DODONÆA CAMFIELDI, n.sp.

A much branched dioecious shrub from about 1 to nearly 2 feet high, glabrous and slightly viscid. Leaves broad-linear, entire, with slightly recurved and somewhat undulate margins, acute, attaining about 1 inch in length, sessile with a broad rounded base and decurrent on the branches in 3 narrow wings. Flowers in short panicles terminal on short branchlets, the staminate flowers on slender pedicels, those of the pistillate flowers somewhat stouter. Sepals frequently reduced to 4 in number, nearly as long as the anthers. Style about $\frac{1}{2}$ inch long, very deciduous as well as the sepals. Capsule with broad wings extending from the base to the top. Seeds not shining, with broad compressed margins.

Waterfall Creek, Nowra, N.S.W., (W. Bäuerlen, November, 1888); about midway between Como and Sutherland, near Sydney, (J. H. Camfield, May, 1897).

This remarkable species belongs to the Section "Cyclopteræ" of Benthams *Flora Australiensis*, but it is not closely allied to any of the described species. The broad sessile bases of the leaves appear to be unique in the genus, and the leaves are further remarkable through the large groups of resin-secreting glands which give them a dotted appearance. In growth it resembles a good deal one of the smaller-leaved forms of *Grevillea sphacelata*, which is one of the plants with which it is associated.

Though recently ascertained to have been first found nine years ago by Mr. Bäuerlen, whose name is already well represented in

the Flora of N. S. Wales, we name the plant in honour of Mr. Camfield, overseer of the Garden Palace grounds, its discoverer in the Port Jackson district, in recognition of the zeal and ability displayed by him in recent years as botanical collector and observer.

COMPOSITÆ.

HELIPTERUM MICROGLOSSUM, n.sp.

A much branched woolly-white herb with a woolly base, apparently not above 6 inches high. Leaves from linear to lanceolate, sessile, the longest attaining about one inch in length. Flower-heads shortly pedunculate or almost sessile, in terminal crowded or corymbose clusters. Involucre nearly cylindrical, with thin pale brown sparingly woolly bracts, the inner ones keeled and with very short white rays. Flowers about 10 in the involucre, achenes silky-hairy, with about 20 pappus-bristles distinctly united at the base.

Tarella, near Wilcannia, N.S.W., (W. Bäuerlen, August, 1887).

Allied to *H. corymbiflorum*, Schlecht., with which species F. v. Mueller unites it as var. *microglossum*, but it differs in so many essential points from the true *H. corymbiflorum*, apparently without any intermediate forms, that we are of opinion it should rank as a species. The chief points of difference between the two species are :

H. CORYMBIFLORUM.

Habit : erect, rather tall, with a corymbose inflorescence. *Involucres* turbinate, with straw-coloured bracts, the inner ones with rays attaining 3 lines in length. *Flowers* about 20 in the head.

H. MICROGLOSSUM.

Habit : spreading, rather small, with a compact and leafy, scarcely corymbose inflorescence. *Involucres* cylindrical, with brown bracts, the inner ones with rays scarcely $\frac{1}{2}$ line in length. *Flowers* about 10 in the head.

Following are additional localities for this species, kindly supplied to us by Mr. J. G. Iuehmann, Curator of the National Herbarium, Melbourne :—

Upper Darling, N.S.W. (Mrs. Kennedy); Barrier Ranges, N.S.W. (Mrs. Irvine, F. Wehl); Evelyn Creek, N.S.W. (A. King); Lake Torrens Plain, S.A. (R. Tate); Yorke Peninsula, S.A. (O. Tepper); Mount Eba, S.A. (E. Giles); Warrina, S.A. (Mrs. Richards).

EPACRIDEÆ.

LEUCOPOGON FLETCHERI, n.sp.

A rather tall (up to 5 or 6 feet) divaricately branched shrub, with minutely pubescent young branches. Leaves spreading, linear, very pungent-pointed, with recurved margins, the longest about 4 lines long. Flowers solitary, pendulous on very short recurved axillary peduncles. Bracteoles broad and obtuse, but minutely mucronate, less than half the length of the sepals. Sepals acute, nearly half the length of the corolla. Corolla fully 4 lines in length, the lobes nearly as long as the tube. Anthers without sterile tips. Hypogynous scales distinct or slightly united. Ovary 5-angled and 5-celled; style very long, exserted from the corolla. Fruit oblong, longer than the calyx, frequently 1-celled and 1-seeded.

Near Springwood, N.S.W., (J. J. Fletcher, September, 1887).

Allied to *L. juniperinus*, R. Br., from which it is chiefly distinguished by the pendulous flowers, the proportionately longer corolla-lobes and the exserted style. Some of the southern forms of *L. juniperinus*, especially Tumut specimens, in the Herbarium of the Botanic Gardens, have pendulous flowers and longer corolla-lobes, and seem to form a connecting link between the two species, but Mr. Fletcher's Springwood specimens are distinguished from all other described species by the exserted style.

DESCRIPTIONS OF TWO NEW SPECIES OF *ACACIA*
FROM NEW SOUTH WALES.

BY R. T. BAKER, F.L.S., ASSISTANT CURATOR, TECHNOLOGICAL
MUSEUM, SYDNEY.

(Plates VIII.-IX.)

ACACIA DAWSONI, sp.nov.

(Pl. VIII.)

A dense, virgate shrub rarely exceeding 5 feet in height, with erect, terete branches, branchlets minutely pubescent, finally flattened or angular, with decurrent lines, showing minute resinous dots. Phyllodia narrow, linear, narrowed at both ends, straight or slightly falcate, obtuse or with a minutely recurved point, under 5 inches long, about 2 lines broad, rigid, many-nerved, the veins distinct, and one or two more prominent than the rest, anastomosing here and there, gland present on the upper edge at the base of the phyllode. Peduncles minutely pubescent, 1 line long, (4-6 forming a raceme much shorter than the phyllode), bearing each a few flowers (4-6), mostly 5-merous. Calyx about half the length of the corolla, deeply lobed, slightly pubescent. Petals glabrous, slightly ribbed, cohering to the middle at first, but eventually becoming free. Pod linear, straight or slightly curved, glabrous, under $2\frac{1}{2}$ inches long, 1 line broad, black; valves convex over the seeds, slightly constricted between them. Seeds elongated, longitudinal, funicle thickened under the seed, with one fold, becoming filiform towards the placenta.

Hab.—Rylstone only, just outside the town, near the angle formed by the Ilford and Glen Alice Roads, where it was first pointed out to me by Mr. J. Dawson, L.S., after whom I have named it.

I am of opinion that this species, in botanical sequence, comes in the Subseries *Oligoneura* of the Series *Plurinerves* of Benthams, as the phyllodia resemble those of *A. elongata* more than that of any other, and which species falls in that group. It differs from *A. elongata*, however, in the phyllodia being more elongated and less rigid, and drying a darker green; in the mode of inflorescence, and having considerably fewer flowers in the head; in its very narrow pod, and also in being a less attractive shrub than that species.

Except in the matter of the phyllodes above alluded to, it is by no means easy to particularise the affinities of this *Acacia* with the others of this group. Of the seven species described under the Subseries *Oligoneura*, it is allied perhaps more to *A. elongata* and *A. subporosa* (narrow-leaved variety), and I have, therefore, placed it between these two. It differs from both in its flowers being in racemes instead of on individual peduncles, and also in its having fewer flowers in the heads; and in this latter feature it appears to stand apart from any other *Acacia*—the number of flowers being so few. The individual flowers closely resemble those of *A. cincinnata*, F.v.M., but this species belongs to the Group *Juliferae*. It is further distinguished from the two above named species by its calyx, petals, pods, arillus and funicle. I should not be surprised if another species or two will yet be discovered to connect it with the narrow-leaved variety of *A. subporosa*, F.v.M.

ACACIA DIFFORMIS, sp.nov.

(Plate IX.)

A small glabrous, shrubby tree, 20 to 30 feet (as far as seen), branchlets angular, very frequently quite flattened. Phyllodia oblanceolate, rigid, coriaceous, very obtuse, falcate in the narrow-leaved form, 3 to 5 inches long in the broad variety and 8 inches in the narrow-leaved variety, from 3 to 12 lines broad, one prominent nerve, with a secondary one between it and the upper edge, running from the base of the phyllode to the gland, and

continuing onward to near the apex, and so forming as it were an intramarginal vein. Sometimes it passes the first gland, and runs on to a second one near the middle of the phyllode. Very often the lower gland appears as though pathologically affected, and then the upper edge of the phyllode has quite a geniculate-shaped appearance. Racemes attenuated, shorter than the phyllodes, with about 15 to 20 small globular heads of about 20 flowers, mostly 5-merous, peduncles 2 to 3 lines. Calyx obtusely lobed, thick at the edges, which are covered with cilia. Petals united above the calyx, but eventually separating, glabrous, slightly ribbed. Pod 7 to 8 inches long, moniliform, valves thinly coriaceous, under 3 lines broad, convex over the seeds, much narrowed between them. Seeds elongated, longitudinal, funicle not folded, thickened under the seed into a club-shaped aril.

Hab.—Tocumwal; Cobar (Rev. J. M. Curran); Digilah, Merrygoen (H. A. Patrick); Bylong (R.T.B.).

This species pertains to the Section *Uninerves* of Benthams's Table and the Subsection *Racemosæ*, and, as will be seen, its alliance is essentially with *A. penninervis* and *A. microbotrya*; indeed the numerous foliage and bud specimens obtained from time to time from various localities bore such a striking resemblance to one of the forms of the former species that they were provisionally labelled *A. penninervis*, Sieb. I have a very complete series showing the variability of the first-named species, so that I am able to speak with some certainty in regard to the distinctive character or specific differences of this new species from either the type or varieties of *A. penninervis*, Sieb.

The "narrow-leaved" variety might easily be confused with a corresponding form of *A. penninervis* occurring at Mogo. The buds, too, are similar to those of *A. penninervis*. The secondary nerve is also present as in *A. penninervis*, but in this particular species, as above mentioned, it is continued onward almost to the apex after colliding as it were with the margin at one or other of the two glands. I have on rare occasions found this to occur also in some of the broad phyllodes of *A. penninervis*, Sieb. The characters which at once separate it from that species are the

long, attenuated, moniliform pod, the elongated seed, and the short filiform funicle. It is further distinguished from *A. penninervis* by its shrubby growth, being never recorded as a tree; by its remarkably flat branchlets; by the edges of the phyllodes being less nerve-like, and also by its sepals and petals.

In botanical sequence its place is between *A. penninervis*, Sieb., and *A. retinoides*, Schl.

It is one of the few *Acacias* exuding a soluble gum, and I am indebted to Mr. H. G. Smith, of the Technological Museum, for the following note on the chemistry of its gum:—

The gum occurring on this species is principally in globular masses of various sizes up to that of a pigeon's egg. Portions of the gum are quite transparent. The colour is mostly of a pale amber, although some portions are of a darkish brown. The gum breaks readily with a bright conchoidal fracture, and when coarsely powdered much resembles in appearance the better class of gums belonging to the arabin group. It is entirely soluble in two or three parts of cold water, with the exception of a small quantity of accidental impurity (bark, &c.). The mucilage formed is of fair viscosity, and strongly adhesive. The aqueous solution is acid to test paper, and is rather dark in colour; alumina, however, clears it sufficiently to allow the determination of its optical properties to be made; it was found to be levo-rotatory like the better class gums. When boiled with dilute sulphuric acid the solution becomes dextro-rotatory, most probably from the formation of Arabinose. Although the present specimen was found to have well-defined optical properties, yet it is often found that the Australian gums are optically inactive.

No precipitate was formed on adding neutral lead acetate, nor was there any alteration on the addition of ferric chloride, except a slight darkening of the solution. On heating with caustic soda the solution becomes yellowish to brownish.

The water present was found to be 13·35 per cent. The ash is small in quantity, being only ·88 per cent; this consists of the usual bases found in connection with arabic acid in most gums,

viz. :—Lime, magnesia (in about equal proportions) and potassium; traces of sulphuric and phosphoric acid were also detected.

Mucic acid was obtained in large quantity by oxidising with nitric acid, the amount being 35·65 per cent., being the mean of three closely agreeing determinations; much oxalic acid was also formed at the same time, that portion crystallising with the mucic acid being removed by alcohol; saccharic acid does not appear to be formed, except perhaps in traces. Australian gums often form large quantities of mucic acid on treatment with nitric acid.

The above results determine this gum to be of commercial value if obtainable in quantity; it may be classed with the second class wattle gums, of which that of *A. pycnantha* is a type. It very much resembles the gum obtained from *A. penninervis* and *A. microbotrya*, Benth.

EXPLANATION OF PLATES.

Plate VIII.

Acacia Dawsoni.

- Fig. 1.—Flowering spray.
- Fig. 2.—Portion of phyllode enlarged to show nervation.
- Fig. 3.—Bud (enlarged).
- Fig. 4.—Flower (enlarged).
- Fig. 5.—Pistil (enlarged).
- Fig. 6.—Pod (nat. size).
- Fig. 7.—Seed showing arillus (enlarged).

Plate IX.

Acacia difformis.

ON A LARVAL TELEOST FROM NEW SOUTH WALES

BY J. DOUGLAS OGILBY.

The only notice of a "leptocephalid" from the New South Wales coast of which I have been able to find any record is that of Mr. Waite (Proc. Linn. Soc. N. S. Wales, (2) ix. 1895, p. 225), who mentions two examples, which may possibly belong to different species, from Port Jackson and Maroubra, but gives no description by which our form may be distinguished from such as may occur on other parts of the Australian coast. Mr. Waite's examples were noticed under the heading of "*Leptocephalus* sp." but this generic name having been primarily used by Scopoli in 1777 for the larval form of the conger eel (the *Muraena conger* of Linnæus, 1758) cannot be applied to the present fish, being necessarily restricted to the true congers, the type of which must therefore be known as *Leptocephalus conger*.

As three examples have lately come into my hands I propose to give here such a description as will enable Australian scientists to recognise our form.

My first specimen was obtained early in the present month on the beach at La Perouse, and came ashore alive at my feet, the wind being at the time light and off the land, the bay without a ripple, and the tide on a strong ebb; I mention these particulars to show that there were no perceptible extraneous influences at work of sufficient importance to account for the stranding. My other two specimens were collected at Maroubra by Mr. Whitelegge, and kindly handed over to me for the purposes of this paper.

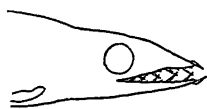
An examination of these larvæ reveals so many points of difference between our fish and the *Leptocephalus morrisii* of the European Seas as to leave no room for doubt that they constitute the larval forms of two very distinct genera of fishes; but until we are in a position to keep such larvæ in confinement, and so observe and record every phase of their development, any attempt

to identify the parent form is mere conjecture, and tends to confusion. I shall, therefore, content myself with drawing attention to the entire absence of any vestige of caudal fin, and make the obvious suggestion that our form is the larva of one of the ophichthyoid eels; so far, however, none of these eels are known to occur on our coast, or at least very rarely.*

In considering the subject of the parentage of these larvæ we must not lose sight of the fact that they are not confined to the apodal fishes, but are common also to certain isospondylous and iniomous genera, such as *Albula*, *Elops*, *Alepocephalus*, and *Stomias*†. *Pieraster* also is said to pass through similar transitional stages.

The following description is taken from the three examples above referred to :—

Body ribband-shaped, of about equal depth throughout, consisting of 148 to 150 metameres, its depth 13 to 17 in its length. Head moderate, not conspicuously distinguished from the body, from which it is separated above by a more or less shallow concavity, its length $16\frac{1}{2}$ to 21 in the total length; snout rather long and pointed, gently ascending on its anterior moiety; cleft of mouth wide, extending to between the middle and posterior border of the eye. Upper jaw with five, lower with six strong, acute, lanceolate, widely set teeth in each ramus, directed forwards and inwards; one or two small teeth, normally directed, between each pair of large teeth; the anterior pair in each jaw are strongly compressed, and originate on the outside (above and below) of the mouth. Eye moderate, its diameter $\frac{1}{2}$ to $\frac{1}{3}$ of the head and about $\frac{1}{2}$ of the snout. Dorsal fin originating



* *Ophisurus serpens* has been recorded once from Port Jackson, and is found as far south as Tasmania, whence I have recorded a specimen in very bad condition.

† Jordan and Evermann, discussing the ancestry of the apodal fishes, remark :—"The *Apodes* are probably descended from Isospondylous or Iniomous types, possibly from ancestors of the *Anacanthini*, and their divergence from typical forms is, in most respects, a retrogression." I have not seen Dr. Gilbert's papers dealing with these isospondylous larvæ.

immediately behind the occiput; anal from $\frac{2}{5}$ to $\frac{3}{5}$ nearer to the tip of the tail than to that of the snout; dorsal and anal rays distinct in one specimen, only a few of the anterior anal rays visible in the others: pectoral fins more or less developed: extremity of the tail free. A short oblique line of dark pigment behind each metamere on the lower side of the vertebral column; intestine with a series of about twenty pigment spots at equal distances apart, many of the spots about as long as the interspace.

NOTES AND EXHIBITS.

Mr. Froggatt exhibited two specimens of the adult female of the large Coccid, *Monophlebus Crawfordi*, Mask., one of which died when enclosed in the box; but the second commenced to lay eggs, and in about two months had produced a mass, four times as large as herself, of cottony substance to cover the eggs and larvæ.

Mrs. Kenyon sent for exhibition a specimen of *Conus anemone* from Victoria, showing a small pearl at the base of the aperture near the edge of the lip; also specimens of the shells of several species of *Cypræa* exhibiting peculiar depressions, markings, or concentric iridescent rings: and she communicated a note suggesting an explanation of the origin of some of them.

Messrs. Maiden and Betche showed a series of botanical specimens in illustration of their paper.

Mr. Turner expressed the opinion that the identification of the grass, exhibited as *Eriachne obtusa*, R.Br., from Rose Bay, was open to question. To him it appeared to be only a depauperated example of *Danthonia, paradoxa*, R.Br.

Mr. Baker exhibited specimens of the Acacias described in his paper.

Mr. A. J. Haynes exhibited a living example of *Moloch horridus*, from a locality some distance inland from Coolgardie, W.A.

Mr. Ogilby showed a beautifully preserved specimen of the Leptocephalid described in his paper.

WEDNESDAY, 30TH JUNE, 1897.

The Ordinary Monthly Meeting of the Society was held in the Linnean Hall, Ithaca Road, Elizabeth Bay, on Wednesday evening, June 30th, 1897.

Professor J. T. Wilson, M.B., President, in the Chair.

Messrs. M. Blunno, Department of Agriculture, Sydney; M. A. O'Callaghan, Department of Agriculture, Sydney; C. D. McIntyre, Sydney University; and W. H. Horton, Sydney University, were elected Members of the Society.

DONATIONS.

Perak Government Gazette. Vol. x. Nos. 10-11 (May, 1897).
From the Government Secretary.

Johns Hopkins University, Baltimore — Hospital Bulletin. Nos. 68-69 (Nov.-Dec. 1896): University Circulars. No. 129 (April, 1897). *From the University.*

U.S. Department of Agriculture — Bulletin. New Series. Nos. 4-5. *From the Secretary of Agriculture.*

American Museum, N.Y. — Bulletin. Vol. ix. Articles viii.-ix. (pp. 115-122—April, 1897). *From the Director.*

Australasian Journal of Pharmacy. Vol. xii. No. 138 (June, 1897). *From the Editor.*

Royal Irish Academy—Proceedings. Third Series. Vol. iv. No. 1 (Dec., 1896). *From the Academy.*

Agricultural Gazette of N.S.W.—Index to Vol. vii. (1896): Vol. viii. Part 4 (April, 1897). *From the Hon. the Minister for Mines and Agriculture.*

Royal Society, London—Proceedings. Vol. lxi: Nos. 367 and 369-370 (March-April, 1897). *From the Society.*

Zoologischer Anzeiger. xx. Band. Nos. 529-531. (April-May, 1897). *From the Editor.*

Department of Mines, Western Australia—Gold Mining Statistics for the Year 1896. *From the Hon. the Minister for Mines.*

Sydney University—Calendar for the year 1897. *From the Senate.*

Natural History Society of Montreal—Canadian Record of Science. Vol. vii. No. 4 (April, 1897). *From the Society.*

Société d'Horticulture du Doubs, Besançon—Bulletin. Sér. illust. No. 16 (Avril, 1897). *From the Society.*

Zoological Society of London—Proceedings, 1896. Part 4: Transactions. Vol. xiv. Part 3; Abstract, May 4th, 1897. *From the Society.*

"A Companion for the Queensland Student of Plant Life." By F. M. Bailey. Second Edition. (1897). *From the Author.*

Société Scientifique du Chili—Actes. T. v. (1895) 5^{me} Liv.; T. vi. (1896) 2^{me} et 3^{me} Liv. *From the Society.*

Field Naturalists' Club of Victoria—Victorian Naturalist. Vol. xiii. Nos. 5-6 (Aug.-Sept., 1896): Vol. xiv. No. 2 (June, 1897). *From the Club.*

Pharmaceutical Journal of Australasia. Vol. x. No. 5. (May, 1897). *From the Editor.*

Bureau of Agriculture, Perth, W.A.—Journal. Vol. iv. Nos. 10-12 (May-June, 1897). *From the Secretary.*

Public Library of New South Wales—Report of the Trustees for 1896. *From the Trustees.*

Archiv für Naturgeschichte. lxi. Jahrg. (1895). ii. Band. 2 Heft. (April, 1897). *From the Editor.*

Société Royale Linnéenne de Bruxelles—Bulletin xxii^{me}. Année, No. 7 (Mai). *From the Society.*

“Wealth and Progress of New South Wales, 1895-96.” Ninth Issue. Vol. i. *From the Government Statistician.*

‘Société Belge de Microscopie—Annales. T. xxi.: Bulletin. xxii^{me}. Année. Nos. 4-6 (Mai, 1897). *From the Society.*

Pamphlet, “Notes on Bryozoa from Rapallo, &c.” By A. W. Waters, F.L.S. *From the Author.*

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REVISION OF THE GENUS PAROPSIS.

BY REV. T. BLACKIURN, B.A., CORRESPONDING MEMBER.

PART II.

TABULATION OF THE SPECIES FORMING SUBGROUP IV. (OF GROUP III.)

- *A. Prothorax distinctly explanate at sides.
 - B. Subhumeral depression present.
 - C. Elytral verrucæ concolorous with derm,
closely set in regular series and not large.
 - D. Marginal part of elytra well defined near
apex, with a distinct sulculus..... *castanea*, Marsh.
 - DD. Marginal part of elytra scarcely distinct
from the discal part..... *catenata*, Chp.
 - CC. Elytral verrucæ not as C.
 - D. The elytral verrucæ normal (small and but
little elevated).
 - E. Prothorax widest close to base, very
strongly narrowed in front..... *tuberculata*, Chp.
 - EE. Prothorax widest not much behind
middle, not very strongly narrowed
in front..... *inops*, Blackb.
 - DD. The elytral verrucæ large and prominent
(concolorous with derm)..... *impressa*, Chp.
- AA. Prothorax not (or scarcely) explanate at sides.
 - B. The punctures of the elytra run evenly over
the verrucæ, which are scarcely elevated.
 - C. The suture broadly black in its front one-
third..... *blanda*, Blackb.
 - CC. The suture without marking..... *punctipennis*, Blackb.
 - BB. The verrucæ unpunctured or nearly so.
 - C. Elytra not having a sharply defined discal
transverse wheal-like ridge.
 - D. Subhumeral depression present.
 - E. Elytral punctures almost lost in the
close rugulosity of interstices; post-
basal impression very slight *creberrima*, Blackb.

* Sides of prothorax only very feebly explanate in *tuberculata* ♀.

- EE. Elytral punctures more distinct than the rugulosity of the interstices.
- F. Elytral margins widely and strongly outslipped..... *versuta*, Blackb. —
- FF. Elytral margins very little outslipped..... *papulosa*, Er.
- DD. Subhumeral depression wanting.
- E. Elytral interstices but little rugulose, at least not to the extent of obscuring the punctures and verrucæ.
- F. Elytra (at least on hinder part) studded with sharply defined isolated bead-like verrucæ.
- G. The elytral verrucæ small.
- H. The elytral puncturation fairly strong and not particularly close.
- I. The postbasal impression of elytra not particularly strong and not at all defined behind.
- J. The humeral calli dark and not particularly small..... *verrucosa*, Marsh.
- JJ. The humeral calli small and pale ferruginous in colour.
- K. Form subcircular, marginal part of elytra strongly out-turned..... *Adelaidæ*, Blackb.
- KK. Form ovate (not nearly subcircular), marginal part of elytra but little out-turned..... *prodroma*, Blackb.
- II. The postbasal impression of elytra very strong and from a certain point of view defined behind by a slight ridge..... *cygnicola*, Blackb.
- HH. The elytral puncturation notably finer and closer.
- I. The marginal part of the elytra (especially near apex) out-turned and well-defined *brevissima*, Blackb.

- II. The marginal part of the
elytra scarcely distinct
from the discal..... *semiglobosa*, Chp.
- GG. The verrucæ notably larger
than in the allied species..... *nodosa*, Chp.
- FF. The hinder part of the elytra not
studded with isolated bead-like
conspicuous verrucæ.
- G. Size very small (Long. less than
 $2\frac{1}{2}$ lines)..... *scalaris*, Chp.
- GG. Size much larger (Long. $3\frac{1}{2}$ lines
or more)..... *vulpina*, Blackb.
- EE. Elytral interstices closely rugulose,
concealing the puncturation..... *fumata*, Blackb.
- CC. Elytra having a sharply defined discal
transverse wheal-like ridge.
- D. The discal ridge of dark colour.
- E. Prothorax very strongly transverse,
with strongly rounded sides..... *Carpentariæ*, Blackb.
- EE. Prothorax much less transverse and
with its sides much less strongly
rounded..... *bicolora*, Blackb.
- DD. The discal ridge concolorous with
general surface of elytra.
- E. Prothorax evidently explanate at the
sides..... *vibex*, Blackb.
- EE. Prothorax not at all explanate at the
sides..... *incurva*, Clk.

P. *INOPS*, sp. nov.

Late subovata, valde convexa, altitudine majori (a latere visa)
ante elytrorum marginem medium posita; minus nitida;
rufo-ferruginea, corpore subtus nigricanti, verrucis piceis,
prothorace utrinque macula laterali et (nonnullorum exem-
plorum) macula discoidali piceis ornato, antennis apicem versus
infuscatîs; capite crebre subfortiter subrugulose punctulato;
prothorace quam longiori ut paullo magis quam $2\frac{1}{3}$ ad 1
latiori, ab apice paullo ultra medium dilatato, pone apicem
transversim impresso, crebre vix aspere minus fortiter (ad
latera grosse rugulose) punctulato, lateribus fortiter arcuatis

late minus leviter deplanatis, angulis posticis rotundatis; scutello sat lævi; elytris sub callum humeralem leviter depressis, pone basin late minus distincte impressis, crebre fortius subseriatim (ad latera multo magis, postice minus, fortiter) punctulatis, verrucis nonnullis (præsertim postice) nitidis seriatim instructis, interstitiis antice leviter (postice vix) rugulosis, parte marginali sat lata a disco (per sulculum vix continuum) divisa, calli humeralis margine interno a sutura quam ab elytrorum margine laterali vix magis distant; segmento ventrali basali crebrius fortiter punctulato. Long. 4, lat. $3\frac{1}{2}$ lines.

The conspicuous round blackish spot (which seems to be constant) on either side of the prothorax accompanied by more or less distinct traces of a smaller spot half-way between it and the middle of the segment distinguishes this species from most that it resembles in other respects. It is also notable for the well elevated though not large verrucæ (some notably smaller than others) which are sparsely distributed over the elytra and for the shape of its prothorax, which is not much narrower in front than at the base and has its greatest width very little behind the middle. The sexes scarcely differ, except in the characters common to the genus and in the male being somewhat more decidedly ovate than the female.

N.S. Wales; taken by Mr. Lea near Queanbeyan.

P. PUNCTIPENNIS, sp.nov.

Sat late ovata; valde convexa; altitudine majori (a latere visa) ante elytrorum marginem medium posita; minus nitida; supra obscure rufa, capite antice et postice nigro, prothorace nigro quadrimaculato (maculis arcuatim dispositis), scutello piceo, elytris nigro-verrucosis; subtus nigro-picea (abdomine plus minusve pallidiori), antennis pedibusque rufis, his plus minusve picescentibus; capite sat crebre subfortiter punctulato; prothorace quam longiori ut $2\frac{3}{4}$ ad 1 latiori, ab apice sat longe ultra medium dilatato, pone apicem transversim vix impresso, ut caput (ad latera grosse rugulose) punctulato, lateribus

arcuatis haud deplanatis, angulis posticis rotundato-obtusis; scutello sat lævi; elytris sub callum humeralem vix depressis, pone basin vix impressis, crebre subfortiter minus seriatim sat æqualiter punctulatis, verrucis numerosis (his sat confuse dispositis, ut superficies punctulatis, vix elevatis) instructis, interstitiis minus rugulosis, parte marginali a disco vix distincta, calli humeralis margine interno a sutura quam ab elytrorum margine laterali sat multo magis distant; segmento ventrali basali subfortiter (maris quam feminae minus crebre) punctulato. Long. $3\frac{3}{4}$, lat. 3 lines.

Easily distinguished from nearly all its congeners by its elytral puncturation being continuous over the surface of the scarcely elevated verrucæ. I have before me an example in which the dark markings of the prothorax are wanting and another in which the elytral verrucæ are distinctly elevated, but I think them mere varieties. The external spots on the prothorax are on the basal (and near the lateral) margins, the other two on either side of the middle of the disc. There is no notable difference between the sexes other than the usual ones.

N.S. Wales; taken by Mr. Lea: also taken in Victoria by Miss Waterhouse.

P. BLANDA, sp.nov.

Præcedenti (*P. punctipenni*) affinis; etiam magis convexa; prothoracis partibus piceis valde disparibus, elytrorum sutura antice late nigra (colore nigro ante medium suturæ dilatato) et disco maculis nigris plus minusve variegato. Long. $3\frac{3}{4}$, lat. 3 lines.

This insect does not appear to be a mere variety of *punctipennis*, though unquestionably very close to it. It is to be noted that the two examples before me were taken in the far north of N.S. Wales, while those of *punctipennis* are all from localities south of Sydney. The markings of the prothorax are too widely different to be only a development of colour. In the most strongly marked *punctipennis* these consist of four conspicuous dark spots placed in the line of a curve with its two extremities on the base; in *blanda* the prothorax is best described as black

with a narrow testaceous rim along the sides and front, this rim much dilated in the middle of the front and there narrowly connected with a large testaceous blotch on the middle of the base. In no example with the prothoracic markings of *punctipennis* is there any dark colouring on the elytra (except the verrucæ); but in both the specimens of *blanda* the suture is broadly black from the base to nearly the middle of its length, with a small dilatation round the scutellum, a larger one a little behind it, and a still larger one at the extremity of the dark colouring, while both examples have some (one more than the other) black blotches on the disc of the elytra. Great as are these differences of colour and markings, I should nevertheless not think it impossible that the two forms might represent one species were it not that *blanda* is a markedly more convex species, the length of its elytra viewed from the side being only half again their height, while in *punctipennis* their length is fully once and three-quarters their height, the elytra in the former species being much more gibbous behind the scutellum than in the latter.

N.S. Wales; Richmond River, &c.; taken by Mr. Lea.

P. CREBERRIMA, sp.nov.

Late subovata, valde convexa, altitudine majori (a latere visa) ante elytrorum marginem medium posita; subnitida; rufo-vel piceo-ferruginea, elytris vittis nonnullis piceis abbreviatis ornatis, capite (nonnullorum exemplorum) piceo-bimaculato; hoc minus crebre minus fortiter punctulato; prothorace quam longiori ut $2\frac{3}{4}$ ad 1 latiori, ab apice longe ultra medium dilatato, pone apicem transversim impresso, crebre subtilius minus æqualiter (ad latera grosse rugulose) punctulato, lateribus sat arcuatis vix deplanatis, angulis posticis rotundatis; scutello haud vel vix punctulato; elytris sub callum humeralem minus distincte depressis, pone basin impressis, sat crebre subseriatim (latera versus paullo magis fortiter) punctulatis, verrucis numerosis subseriatis sat æqualiter dispositis instructis, interstitiis confertim rugulosis (sicut

puncturæ vix perspicuæ sunt), parte marginali latissima oblique extrorsum directa a disco sat distincta, calli humeralis margine interno a sutura quam ab elytrorum margine laterali haud magis distant; segmento ventrali basali subtilius punctulato. Long. 4, lat. $3\frac{1}{5}$ lines.

The vittæ on each elytron are two short ones on the front part of the disc placed side by side and a longer one on the hinder part of the lateral margin of the disc; in some examples they are scarcely traceable. The species is readily distinguishable among its near allies by the close rugulosity of its elytra by which the puncturation is rendered very inconspicuous. There is scarcely any difference between the male and female except in characters common to the genus.

S. and W. Australia.

P. VERSUTA, sp.nov.

Late subovata (♀ ovalis), valde convexa, altitudine majori (a latere visa) ante elytrorum marginem medium posita; subnitida; rufo-ferruginea, sternis elytrorum verrucis et (nonnullorum exemplorum plus minusve) antennis abdomine maculisque in capite duabus piceis vel nigropiceis; capite crebre subtilius punctulato; prothorace quam longiori ut $2\frac{1}{2}$ ad 1 latiori, ab apice longe ultra medium dilatato, pone apicem transversim impresso, crebre minus fortiter (ad latera grosse rugulose) punctulato, lateribus sat arcuatis haud deplanatis, angulis posticis nullis; scutello lævi; elytris sub callum humeralem leviter depressis, pone basin late transversim minus leviter impressis, minus fortiter subseriatim (ad latera minus crebre paullo magis fortiter) punctulatis, verrucis parvis numerosis confuse instructis, interstitiis sat rugulosis, parte marginali sat lata oblique extrorsum directa a disco (per sulculum continuum postice sat profundum) bene divisa, calli humeralis margine interno a sutura quam ab elytrorum margine laterali vix magis distant; segmento ventrali basali subcrebre minus fortiter punctulato. Long. $3\frac{4}{5}$, lat. $2\frac{4}{5}$ lines.

The best distinctive characters of this species among its near allies seem to be the strongly defined postbasal wide transverse impression of its elytra, which in some examples is even limited behind by an indication of a raised margin (when looked at from a certain point of view) suggestive of the transverse wheal-like ridge that characterises *P. transversalis*, &c., and the well-marked longitudinal depression between the discal and marginal parts of the elytra. In addition to the usual sexual distinctions, I find that in the male the greatest width of the elytra is distinctly nearer the apex than in the female, and that the female is more strongly convex than the male. In one example the elytra bear some ill-defined piceous blotches.

Victoria (Alpine region) and N.S. Wales.

P. ADELAIDÆ, sp. nov.

Late ovata, valde convexa, altitudine majori (a latere visa) ante elytrorum marginem medium posita; modice nitida; rufo-ferruginea, antennis apicem versus obscuris; ex elytrorum verrucis nonnullis piceis; capite sat crebre minus fortiter punctulato; prothorace quam longiori ut $2\frac{3}{4}$ ad 1 latiori, ab apice fere ad basin dilatato, pone apicem transversim vix impresso, sat crebre subtilius (ad latera magis grosse) punctulato, lateribus sat arcuatis vix deplanatis, angulis posticis nullis; scutello vix vel sparsim subtiliter punctulato; elytris haud sub callum humeralem depresso, pone basin vix impressis, subseriatim sat fortiter (latera versus magis grosse apicem versus magis subtiliter) punctulatis, verrucis parvis sparsis præsertim in parte posteriori positis, interstitiis antice vix (postice manifeste) rugulosis, parte marginali latissima a disco (per sulculum ante medium vix interruptum) divisa, calli humeralis margine interno a sutura quam ab elytrorum margine laterali haud magis distant; segmento ventrali basali fortius minus crebre punctulato. Long. 3, lat. $2\frac{1}{2}$ lines.

A small species of subglobular appearance, of a uniform reddish-ferruginous colour except the apical part of the antennæ and some of the verrucæ (the latter small and thinly scattered mostly

over the apical half of the elytra) which are darker. There is little noticeable difference between the sexes.

S. Australia; Adelaide district.

P. PRODROMA, sp.nov.

♂. *P. brevissimæ* affinis; minus brevis; sternis, elytrorum verrucis, et antennis apicem versus picescentibus; capite minus confertim minus subtiliter punctulato; prothoracis lateribus subdilatatis; elytris fortiter punctulatis, pone basin vix impressis, interstitiis latera versus rugas transversas (certo adspectu) simulantibus, parte marginali a disco vix distincta; cetera ut *P. brevissima*. Long. 3, lat. $2\frac{2}{5}$ lines.

The lateral portions of the prothorax in this species certainly do not continue the convexity of the disc so evenly as in *P. verrucosa*, *brevissima*, &c. Apart from the character already referred to, it is very near *P. verrucosa*, Marsh., but differs in the markedly coarser puncturation of its elytra, in the marginal part of its elytra considerably less directed obliquely outward, and in its humeral calli concolorous with the derm. It also somewhat resembles *P. Adelaideæ*, but is a less wide species with the sides of its prothorax scarcely explanate and its elytral puncturation notably coarser. The transversely wrinkled appearance of the elytra near the lateral margins seems to be a good distinctive character.

Victoria; unique in my collection.

P. CYGNICOLA, sp.nov.

♀. Late subovata, valde convexa, altitudine majori (a latere visa) ante elytrorum marginem medium posita; sat nitida; testaceo-ferruginea, sternis (ex parte) tarsis (ex parte) antennis apicem summum versus et elytrorum verrucis picescentibus; capite confertim subtilius punctulato; prothorace quam longiori ut $2\frac{2}{3}$ ad 1 latiori, ab apice paullo ultra medium dilatato, pone apicem transversim impresso, ut caput (ad latera grosse rugulose) punctulato, lateribus sat fortiter arcuatis haud deplanatis, angulis posticis nullis;

scutello nitido fere lævi; elytris sub callum humeralem haud depressis, pone basin transversim fortiter impressis, subfortiter subseriatim (ad latera magis, postice minus, fortiter) punctulatis, verrucis sat numerosis minus parvis (in parte basali impressa carentibus) vix seriatim instructis, interstitiis vix (postice magis distincte) rugulosis sed hic illic ut rugæ transversæ certo adspectu apparentibus, parte marginali sat lata a disco (per sulculum subobsoletum sat continuum) sat distincta extrorsum oblique subfortiter directa, calli humeralis margine interno a sutura quam ab elytrorum margine laterali haud magis distanti; segmento ventrali basali crebre minus fortiter punctulato. Long. 3 (vix), lat. $2\frac{2}{3}$ lines.

A species of inconspicuous appearance considerably resembling *P. verrucosa* and its allies, but differing from them *inter alia* by the considerably more rugulose interstices (especially behind) of the elytral interstices and by the more strongly marked postbasal impression of its elytra. Also near *papulosa*, Er., from which it differs *inter alia* by the very much closer and finer puncturation of its prothorax.

W. Australia; Swan River; taken by Mr. Lea.

P. BREVISSIMA, sp. nov.

♂. Latissime subovata, valde convexa, altitudine majori (a latere visa) ante elytrorum marginem medium posita; subnitida; tota rufo-ferruginea; capite confertim subtilius subaspere punctulato; prothorace quam longiori ut $2\frac{1}{2}$ ad 1 latiori, ab apice fere ad basin dilatato, pone apicem transversim impresso, crebrius sat subtiliter (ad latera magis grosse) punctulato, lateribus minus arcuatis haud deplanatis, angulis posticis rotundatis; scutello sparsim subtilius punctulato; elytris sub callum humeralem haud depressis, pone basin transversim manifeste impressis, crebre subtilius subseriatim (ad latera paullo magis fortiter) punctulatis, verrucis modicis in parte postica subseriatim instructis, interstitiis vix rugulosis, parte marginali sat lata a disco antice vix postice (per

sulculum sat impressum) manifeste distincta, calli humeralis margine interno a sutura et ab elytrorum margine laterali æquidistanti. Long. $2\frac{1}{2}$, lat. $2\frac{1}{5}$ lines.

The unique example of this insect differs from all its near allies in its uniform ferruginous colour, even the elytral verrucæ being quite concolorous. It is very near *verrucosa*, Marsh., of which (thanks to Mr. Masters!) I have seen the example in the old Macleay collection (probably the type), but differs from it (apart from colour) by the considerably finer puncturation of its elytra and the presence of a well marked transverse postbasal impression on the same which is from a certain point of view limited behind as in *P. versuta*. It is also to be noted that the intermediate verrucæ of the prothorax are distinctly (though not strongly) manifest in this species.

N.S. Wales.

P. VULPINA, sp. nov.

Subglobula, valde convexa, altitudine majori (a latere visa) ante elytrorum marginem medium posita; modice nitida; ferruginea, antennis apicem versus (his elongatis) sternis et nonnullorum exemplorum maculis nonnullis in prothorace positis infuscatis; capite confertim subtilius punctulato; prothorace quam longiori ut $2\frac{3}{4}$ ad 1 latiori, ab apice paullo ultra medium dilatato, pone apicem transversim impresso, crebre minus fortiter (ad latera rugulose grossissime) punctulato, lateribus sat fortiter arcuatis haud deplanatis, angulis posticis rotundatis; scutello vix manifeste punctulato; elytris sub callum humeralem haud depressis, pone basin haud impressis, crebre minus fortiter vix seriatim (ad latera multo magis grosse, postice sat subtiliter) punctulatis, verrucis, numerosis parvis inconspicuis instructis, interstitiis leviter subreticulatim rugulosis, parte marginali a disco vix (postice per sulculum obsolete impressum) distincta, calli humeralis parum elevati margine interno a sutura quam ab elytrorum margine laterali vix magis distant, segmento ventrali basali sparsius minus fortiter punctulato. Long. $3\frac{1}{2}$ -4, lat. 3 - $3\frac{2}{5}$ lines.

A species very unlike any other known to me (among those having the elytra highest considerably in front of the middle) on account of the close rather fine puncturation of the elytral disc and the extreme inconspicuousness of the elytral verrucæ which are concolorous (or nearly so) with the derm. In these respects and in colouring it resembles *P. alta* and *inornata*, which, however, belong to the subgroup having the greatest height of the elytra much further back. I do not find any noteworthy sexual differences beyond those common to the genus.

W. Australia; Swan River; taken by Mr. Lea.

P. FUMATA, sp. nov.

♂. Late subovata, valde convexa, altitudine majori (a latere visa) ante elytrorum marginem medium posita; modice nitida; ferruginea, in capite maculis 2 in prothorace verrucis externis et in elytris maculis vel vittis nonnullis indeterminatis verrucarumque nonnullis piceis, corpore subtus plus minusve infuscato; capite sat crebre fortius punctulato; prothorace quam longiori ut $2\frac{2}{3}$ ad 1 latiori, ab apice longe ultra medium dilatato, pone apicem transversim impresso, sat inæquali, crebre subfortiter subrugulose (ad latera subgrosse) punctulato, lateribus modice arcuatis haud deplanatis, angulis posticis rotundatis; scutello sparsissime vel vix punctulato; elytris sub callum humeralem haud depressis, pone basin haud impressis, subseriatim minus fortiter subæqualiter punctulatis, verrucis parvis sat numerosis minus distinctis vix seriatim instructis, interstitiis rugulosis hic illic transversim rugiformibus et puncturas nonnihil obscurantibus, parte marginali sat lata a disco (per sulculum subobsoletum ad apicem continuum) sat manifeste divisa, calli humeralis margine interno a sutura quam ab elytrorum margine laterali vix magis distant; segmento ventrali basali sparsim subtilius punctulato. Long. 3, lat. $2\frac{2}{3}$ lines (vix).

Notable for the rugulose interstices of its elytra which considerably obscure the puncturation and tend to run here and there into short transverse wrinkles. Resembles *creberrima* in the above

respects but is very much smaller, with the marginal part of the elytra narrower and less out-turned, and having the lateral verrucæ of the prothorax conspicuously piceous in colour; also of less wide form.

S. Australia; Adelaide district, Freeling, &c.

P. CARPENTARIÆ, sp. nov.

♀. *Modice lata, valde convexa, altitudine majori (a latere visa) ante elytrorum marginem medium posita; minus nitida; pallide ferruginea; maculis in capite 2, notis nonnullis indeterminatis in prothorace elytris sternisque, et elytrorum verrucis vibicibusque, infuscatis vel piceis; capite sat fortiter sat crebre punctulato; prothorace quam longiori ut $2\frac{2}{3}$ ad 1 latiori, ab apice paullo ultra medium dilatato, pone apicem haud transversim impresso, verrucis 4 sat manifestis transversim instructo, fortiter sat rugulose punctulato, lateribus fortiter arcuatis vix deplanatis, angulis posticis rotundatis; scutello fere ut prothorax punctulato; elytris sub callum humeralem haud depresso, pone basin transversim impressis, parte impressa postice ruga elevata transversa elongata marginata, sat fortiter minus crebre subseriatim (ad latera paullo magis, postice paullo minus fortiter) punctulatis, verrucis sat numerosis instructis (ex his nonnullis vibices breves transversas simulantibus), interstitiis haud rugulosis, parte marginali sat lata a disco (per sulcolum continuum) modice distincta, calli humeralis margine interno a sutura quam ab elytrorum margine laterali paullo magis distant; segmento ventrali basali subgrosse minus crebre punctulato.*
Long. $2\frac{4}{5}$, lat. 2 lines.

This species is the only *Paropsis* of this subgroup that I have seen having in combination a sharply defined elongate wheal-like transverse ridge of dark colour on each elytron, and the prothorax without any well-defined markings. It may be noted also that the sides of the prothorax and elytra are of more pallid colour than the disc.

N. Queensland; sent to me by Mr. French.

P. BICOLORA, sp.nov.

Præcedenti (*P. Carpentariæ*) affinis; differt prothorace utrinque macula magna aterrima ornato, paullo minus transverso, minus grosse minus rugulose punctulato, lateribus multo minus arcuatis nullo modo deplanatis; elytrorum parte marginali a disco vix distincta; segmento ventrali basali minus fortiter punctulato; cetera ut *P. Carpentariæ*. Long. $2\frac{4}{5}$, lat. 2 lines.

Very near the preceding, but certainly I think distinct on account of its very differently shaped and sculptured prothorax. It is one of the prettiest species of this subgroup, all its markings being of a deep black colour, in strong contrast to the pallid derm. There is little difference between the sexes apart from the characters common to the genus.

N. S. Wales; Whitton; sent by Mr. Lea.

P. VIBEX, sp.nov.

Sat late ovata; valde convexa; altitudine majori (a latere visa) ante elytrorum marginem medium posita; modice nitida; rufo-ferruginea, elytris antice (et postice ad disci marginem) indeterminate et incerte picescentibus; capite sat crebre subaspere vix fortiter punctulato; prothorace quam longiori fere ut $2\frac{1}{2}$ ad 1 latiori, ab apice ultra medium dilatato, pone apicem vix impresso, inæquali, minus crebre minus fortiter (ad latera vix grosse) punctulato, lateribus minus arcuatis vix deplanatis, angulis posticis rotundatis; scutello crebre minus subtiliter punctulato; elytris haud sub callum humeralem depressis, pone basin transversim impressis, subseriatim sat crebre minus fortiter (apicem versus magis subtiliter, ad latera paullo magis grosse) punctulatis, verrucis sat numerosis instructis (his in parte impressa postbasali carentibus, pone hanc partem ut ruga transversa fere a sutura ad marginem lateralem continua confluentibus), interstitiis vix rugulosis, parte marginali a disco vix distincta, calli humeralis margine interno a sutura quam ab elytrorum margine laterali haud magis distanti; segmento ventrali basali sparsim leviter punctulato. Long. $2\frac{4}{5}$, lat. $1\frac{4}{5}$ lines.

The transverse wheal-like ridge crossing the elytra somewhat in front of the middle is a character at once separating this species from all but a small number of its congeners. Several of the species described by the Rev. H. Clark from W. Australia seem from their descriptions to present this character; but although I doubt whether I have seen any of them they are evidently distinct from the present one, being of different size or colouration. In the present insect there are several short transverse ridges behind the long one, and the verrucæ and ridges are all quite concolorous with the derm. The dark markings on the elytra are not at all sharply defined, and consist (in the examples before me) of a blotch on each elytron near the scutellum, another on the humeral callus and an obscure vitta near the apex on the external margin of the disc. There is little noticeable difference between the sexes. It is perhaps just possible that this insect is *P. nervosa*, Clk., but as that species is described as having a large quadrate black spot on the prothorax on either side, of which there is no trace in the examples before me, identity seems very improbable.

W. Australia; Geraldton; sent by Mr. Lea.

GROUP IV.

This is a small group that Dr. Chapuis included in his Group iv. (which otherwise is equivalent to my Group iii.) as consisting of aberrant forms. But as that learned author constituted it, a good half of its species are much more genuinely to be considered as aberrant forms of his Group iii. (my Group v.). I am very much dissatisfied with the existence of this group, but nevertheless its recognition seems to be essential to the classification of the groups on characters of sculpture, which (as I have already remarked) seems to me to be the only workable classification. It will be remembered that (*vide* P.L.S.N.S.W. 1896, p. 638) the present aggregate differs from Group i. by its prothorax neither bisinuate on the sides nor mucronate in front, from Group ii. by its elytral sculpture being linear in arrangement, from Group iii. by its elytra not being verrucose, and from Group v. by the series of punctures on its elytra not being 10 in number. The first six

in the species tabulation are obviously nothing but members of Group iii. in which the verrucæ are wanting. The remainder, however, have no connection with those six except by the accidental circumstance of having on their elytra rows of punctures which are not 10 in number; they are undoubtedly simply members of Group v. in which the 10 series are either so much interrupted or out of symmetry or so much obscured by interstitial punctures as to be untraceable (indeed one or two of them—*e.g.*, *M. fuscum*, Boh.—might almost as well stand in Group v. as Group iv., inasmuch as with careful attention the 10 series can be made out scarcely less distinctly than in several—*e.g.*, *jucunda*, Chp.—which Dr. Chapuis placed in the other group). Nearly all of them are small nitid species with brightly coloured sharply defined markings.

In Group iv. I place 27 species. Of these it is not clear whether *multiseriata*, Chp., belongs to the allies of Group iii. or of Group v. Of the remainder 7 belong to the former aggregate and 19 to the latter. Of the 7 two are new species described below; one (*P. obscurella*, Chp., from Central Australia) I am confident I have not seen; and the other four I have been able to identify confidently, though I have not seen an authentic type of any. Of the 19 species forming the aggregate allied to Group v., there are three that I am confident I have not seen—viz., *spectabilis*, Chp.; *pallidula*, Chp.; and *livida*, Chp.; three are new species described below; three are represented in my collection by authentic types; one is a species I have previously described myself; and the remaining nine I have been able to identify confidently by means of the descriptions. As in the previous tabulations, the names of the species identified by comparison with descriptions are printed in italics.

There may of course be some species belonging to this group among those of Boisduval, &c., which Dr. Chapuis considered to be so insufficiently described that they could not be referred to any group, and which I have previously referred to.

In most of the species of this group the markings are sufficiently well-defined and constant to allow of their being used as reliable characters in tabulation.

TABULATION OF THE SPECIES FORMING GROUP IV.

- A. Elytra with a distinct subbasal impression.
 - B. Lateral margins of prothorax quite strongly explanate *arcula*, Chp.
 - BB. Lateral margins of prothorax not or scarcely explanate.
 - C. The subbasal impression of the elytra extremely strong..... *sublineata*, Bohem.
 - CC. The subbasal impression of the elytra very feeble.
 - D. Size very small. The scutellum punctured simplex, Blackb.
 - DD. Size much larger. Scutellum unpunctured and very nitid..... *crebra*, Blackb.
 - AA. Subbasal impression of elytra wanting or almost wanting.
 - B. Elytral edging of scutellum convex and ridge-like.
 - C. The spots on the prothorax run at equal intervals transversely across the middle line..... *orbicularis*, Chp.
 - CC. Interval between the two intermediate spots of the prothorax much greater than between the intermediate and lateral spots..... *diffusa*, Chp.
 - BB. Elytral edging of scutellum quite flat.
 - C. Marginal part of elytra near apex strongly defined and out-turned and separated from disc by a well-defined sulculus.
 - D. Elytral puncturation more or less fine.
 - E. Prothorax black or with only a narrow testaceous lateral edging *tetraspilota*, Chp.
 - EE. Prothorax with sharply limited black and testaceous markings (the latter not limited to the lateral edges).
 - F. Elytra with dark markings on a testaceous surface.
 - G. Elytra not having a broad black discal vitta.

- H. The postmedian marking of the elytra consists of a large V-shaped black blotch..... *lachesis*, Stål.
- HH. Elytra not marked as H..... *basicollis*, Chp.
- GG. Elytra with a broad black discal vitta reaching from the base nearly to the apex..... *pulchella*, Chp.
- FF. Elytra black with a testaceous (entire or interrupted) spot..... *picturata*, Chp.
- DD. Elytral puncturation much coarser and deeper.
- E. Prothorax without defined markings *perplexa*, Chp.
- EE. Prothorax with sharply limited black markings..... *quadrizonata*, Blkb.
- CC. Marginal part of elytra near apex not (or scarcely) distinguishable from the discal part.
- D. Elytra variegated with light and dark colouring.
- E. The dark colouring not limited to the suture and humeral callus.
- F. The puncturation of the elytra runs evenly over the colours.
- G. Upper surface testaceous, with darker markings.
- H. Prothorax without defined markings..... *rubiginosa*, Chp.
- HH. Prothorax with two sharply defined black spots..... *nigropicta*, Clk.
- GG. Upper surface black, with some reddish markings..... *rufopicta*, Blackb.
- FF. The puncturation of the elytra obsolete on the more lightly coloured parts.
- G. The lighter colouring of the elytra takes the form of numerous spots and blotches..... *tigrina*, Chp.
- GG. The lighter colouring takes the form of longitudinal vittæ *eyrensis*, Blackb.

EE. The dark colouring of the elytra,

limited to the suture and humeral

callus *suturrella*, Chp.

DD. Elytra entirely black..... *tarsalis*, Blackb.

DDD. Elytra entirely testaceous..... *M-fuscum*, Bohem.

P. SIMPLEX, sp.nov.

Sat late ovata; nitida; sat convexa; altitudine majori (a latere visa) contra elytrorum marginem medium posita; tota rufo-brunnea; capite crebre subfortiter punctulato; prothorace quam longiori ut $2\frac{5}{8}$ ad 1 latiori, pone apicem transversim impresso, ab apice sat longe ultra medium dilatato, sat crebre subfortiter (ad latera grosse rugulose) punctulato, lateribus modice arcuatis haud deplanatis, angulis posticis obtusis, scutello punctulato; elytris sub callum humeralem vix depressis, pone basin transversim leviter impressis, crebrius subfortiter subseriatim punctulatis, parte marginali sat angusta (hac postice oblique extus sat fortiter directa) a disco modice distincta, calli humeralis margine interno a sutura quam ab elytrorum margine laterali paullo magis distante; segmento ventrali basali sparsius sat subtiliter punctulato. Long. $2\frac{2}{3}$, lat. $1\frac{9}{10}$ lines.

A small species with much general resemblance to those of the preceding group, but without elytral verrucæ. There is little difference between the sexes apart from the characters common to all *Paropses*.

N. W. Australia; sent by Mr. Masters.

P. CREBRA, sp.nov.

Sat late ovata; sat nitida; sat convexa; altitudine majori (a latere visa) contra elytrorum marginem medium posita; rufo-brunnea, sternis antennarum parte apicali et notulis indeterminatis in prothorace nonnullis infuscatis; capite crebre subfortiter punctulato; prothorace quam longiori ut $2\frac{1}{2}$ ad 1 latiori, pone apicem vix impresso, ab apice longe ultra medium dilatato, dupliciter (crebrius subtilissime et minus crebre subfortiter, ad latera grosse rugulose) punctu-

lato, lateribus sat fortiter arcuatis haud deplanatis, angulis posticis rotundatis; scutello lævi; elytris sub callum humeralem leviter depressis, pone basin transversim minus evidenter impressis, crebrius subfortiter subseriatim (ad latera magis, postice minus, fortiter) punctulatis, parte marginali modice lata (hac postice oblique extus sat fortiter directa) a disco sat distincta, calli humeralis margine interno a sutura quam ab elytrorum margine laterali vix magis distant; segmento ventrali basali fere lævi. Long. $3\frac{1}{2}$, lat. $2\frac{1}{2}$ lines.

Much resembles the preceding species (*P. simplex*) but differs by its considerably larger size, the infuscation of some of its parts (especially a small spot on either side of the middle of the prothorax), the evidently more strongly rounded sides of the prothorax, the elytral puncturation more evidently becoming coarser towards the sides and finer towards the apex, the basal ventral segment almost unpunctured, &c., &c. A specimen in the S. Australian Museum has much more distinct blackish spots on its elytra than any other example that I have seen.

Kangaroo Island; Mr. Tepper, &c.

P. TETRASPILOTA, Chp. (var. *diemenensis*, Blackb.).

The only variety I have seen of this species is a Tasmanian example in the collection of Mr. Simson, of Launceston. As I have not seen a typical example from Tasmania, it is possible that further observation may show this to be a good species, but I do not observe any structural divergence from the type in this unique specimen. Its peculiarities consist in its prothorax having a testaceous edging on either side and the red spots on its elytra being (*a*) a very small spot close to the scutellum and (*b*) another spot very little larger close to the external limit of the disc and a little behind its middle.

P. LACHESIS, Stål.

Among a large number of examples of this species that I have examined I do not find any notable variation except in the intermediate spots on the prothorax being sometimes united and the

surface colour of the elytra being more red in some examples than in others.

P. BASICOLLIS, Chp.

The only variety that I have seen of this species is a very remarkable one that I met with in the Australian Alps (in company with the type), in which the discal spots of the elytra are entirely wanting.

P. PICTURATA, Chp.

This species rarely varies except in the size of the red spot enclosed within the discal black vitta of the prothorax; nevertheless I have an example from Queensland in which the said red spot is enlarged to the extent of interrupting the black vitta so that the latter takes the form of two black spots (one of them basal and quadrate with its front margin emarginate, the other apical and triangular with its base on the front margin of the segment), and the elytral red spot is widely interrupted.

P. PERPLEXA, Chp.

Dr. Chapuis placed this species in his "Groupe ii." I feel no doubt, however, that this was an oversight on his part, as its natural place is obviously among the species which he placed in his "Groupe iv." and it is really very close to *P. rubiginosa*, Chp. I regard it also as allied to *P. orphana*, Chp., and *suturalis*, Germ., although the exigencies of classification require its being widely separated from them on account of the very different sculpture of its elytra.

P. QUADRIZONATA, sp. nov.

Late ovalis, sat convexa, altitudine majori (a latere visa) contra elytrorum marginem medium posita; supra rufa, capite (labro et macula interoculari parva exceptis) prothoracis maculis discoidalibus 4 (transversim positis) et elytrorum notulis nonnullis (sc. regione scutellari, sutura—tota vel in parte—, macula magna basali callum humeralem includenti, maculis 2 paullo pone basin transversim positis, notula falciformi pone medium posita, et macula ante-apicali transversim oblonga) nigris; subtus nigra, pedibus et antennarum parte basali rufis (tibiarum basi nigris); capite minus crebre

dupliciter (subtiliter et sat fortiter) punctulato; prothorace
 quam longiori ut $2\frac{2}{3}$ ad 1 latiori pone apicem haud impresso,
 ab apice paullo ultra medium dilatato, sparsius subtilius (ad
 latera grosse minus sparsim) punctulato, lateribus minus
 arcuatis haud deplanatis, angulis posticis obtusis; scutello
 sat lævi; elytris sub callum humeralem haud depressis, pone
 basin haud impressis, sat crebre vix fortiter subseriatim (ad
 latera paullo magis postice paullo minus, fortiter; intervallis
 nonnullis sat lævibus) punctulatis, parte marginali a disco
 vix distincta, calli humeralis margine interno a sutura quam
 ab elytrorum margine laterali paullo magis distant; segmento
 ventrali basali sparsius subtilius punctulato. Long. $2\frac{1}{2}$, lat.
 2 lines.

A very pretty little species, apparently not variable except in
 the subapical spot on the elytra being in some examples connected
 with the suture, and not presenting any unusual sexual distinc-
 tions.

Victoria; Alpine region.

P. NIGROPICTA, Clk.

The insect which I cannot doubt is this species does not agree
 perfectly with Clark's description in respect of its colour and
 markings. I have examples before me from widely separated
 districts of Western Australia (including Champion Bay, which
 seems to have been the locality of the type). The differences are
 as follows:—Clark especially notes that the labrum is black,
 which it is not in any of the numerous examples I have seen, and
 he omits to mention that the post-median fascia is dilated hind-
 ward on the suture to join the apical marking (which it is on every
 example that I have seen). Nevertheless, I regard it as most
 improbable that there is another species occurring in the same
 localities as the species before me and so extremely close to it as
 would be the case if my identification is incorrect. Probably in
 Clark's examples the labrum had become by some means dis-
 coloured, and the other discrepancy no doubt arises from an
 omission on the part of the describer.

P. RUFOPICTA, Blackb.

It will be well to take this opportunity of mentioning the following characters not enumerated in the original description, viz., greatest height of elytra slightly in front of the middle of the elytral margin as viewed from the side, width of prothorax to length as $2\frac{1}{3}$ to 1, elytra not depressed below the humeral callus and without any subbasal impression, marginal part of elytra very little distinguishable even near the apex from the discal part, humeral callus feebly marked (its inner edge decidedly further from the suture than from the lateral margin of the elytra), basal ventral segment sparsely and somewhat strongly punctulate.

P. EYRENSIS, sp. nov.

- ♂. Subovata; minus lata; nitida; sat convexa, altitudine majori (a latere visa) pone elytrorum marginem medium posita; testaceo-brunnea, capite medio prothorace (transversim sinuatum) elytrorum vittis numerosis et abdomine infuscat; capite dupliciter (crebrius subtilissime et sparsim subgrosse) punctulato; prothorace quam longiori ut $2\frac{1}{2}$ ad 1 latiori, pone apicem haud impresso, ab apice paullo ultra medium dilatato, subtiliter minus confertim (ad latera sparsim grosse) punctulato, lateribus minus arcuatis haud deplanatis, angulis posticis obtusis; scutello sat laevi; elytris sub callum humeralem haud depressis, pone basin haud impressis, inæqualiter sat grosse minus crebre subseriatim punctulatis, parte marginali a disco haud distincta, calli humeralis margine interno a sutura quam ab elytrorum margine laterali multo magis distant; segmento ventrali basali sparsim leviter punctulato. Long. 2, lat. $1\frac{1}{5}$ lines.

The infusate mark on the prothorax is probably variable; in the type it is a central blotch from either side of which a curved narrow line runs out nearly to the margin (this line is continuous on one side and interrupted on the other). On the elytra the infusate vittæ are of darker colour than the markings of the other parts and may be described as (on each elytron) four pairs of fine lines of which the external three are irregularly dilated and

coalescing for the greater part of their length. The irregularity of the elytral puncturation does not consist in the size of the punctures but in their being placed almost exclusively on the infusate parts of the surface and in their seriate arrangement being here and there considerably confused.

Central Australia; Basin of Lake Eyre.

P. TARSALIS, sp. nov.

♂. Sat late ovalis; modice convexa, altitudine majori (a latere visa) ante elytrorum marginem medium posita; nitida; nigra, antennis (his apice infuscatis) labro mandibulis prosterno medio coxis capiteque subtus testaceis, tarsis rufis; capite crebrius dupliciter (subtiliter et subgrosse) punctulato; prothorace quam longiori duplo latiori, pone apicem haud impresso, ab apice fere ad basin leviter dilatato subfortiter minus crebre (antice magis crebre, ad latera grosse) punctulato, lateribus minus arcuatis haud deplanatis, angulis posticis obtusis sat bene determinatis; scutello lævi; elytris sub callum humeralem vix depressis, pone basin haud impressis, sat fortiter subseriatim punctulatis, parte marginali a disco vix distincta, calli humeralis margine interno a sutura quam ab elytrorum margine laterali paullo magis distant. Long. 2, lat. $1\frac{2}{10}$ lines.

A very distinct species on account of its entirely black upper surface, which is probably constant.

Victoria.

P. M-FUSCUM, Bohem.

This is a variable species in respect of its colouring, the upper surface being of various shades from whitish-yellow to reddish-brown or even dark brown (the latter colour being probably the result of long immersion in spirits), and the underside, femora, and antennæ being more or less infusate or even blackish in parts. It evidently forms a connecting link between the present and the next group of species, having all the facies of the next group, but with the puncturation of its elytra very irregular and, so far as it is seriate, consisting of ten *double* rows of punctures.

ON THE *CARENIDES* (FAM. *CARABIDÆ*)

No. III.*

BY THOMAS G. SLOANE.

In the present paper twenty new species are added to the *Carenides*, several of which are remarkable and isolated species which can hardly be placed with any of those previously described; such are *Carenum reflexum*, *C. acutipes*, *C. pulchrum*, *Eutoma* (?) *aberrans* and *Neocarenum spenceri*. The discovery of so many peculiar species helps to show how far we are still from a complete knowledge of the many varying forms which exist among *Carenides*, and leads to the belief that any classification of the tribe made with the data at present available must be looked upon as merely provisional.

A considerable amount of confusion is found among writers on the *Carenides* with regard to the terms applied to certain parts of the head; therefore it seems necessary to attempt a more exact definition of at least some of the features used in describing species, and for the sake of uniformity the terms employed by me for various parts of the head in the genus *Clivina* are now suggested for the same features in the *Carenides*.

The clypeus.—In *Clivina* the clypeus may be divided into three parts,† two of which, viz., the *median part* and the *wings*, may be used among the *Carenides*. The median part is immediately behind the labrum; it is usually defined on each side by a more or less prominent triangular projection (*intermediate angles* of the clypeus); in the genus *Scaraphites* the intermediate angles are obsolete.

* For first paper, *vide* P.L.S.N.S.W. 1888, iii. (2), pp. 1101-1122.

For second paper, *vide* l.c. 1893, viii. (2), pp. 448-483.

† *Vide* P.L.S.N.S.W. 1896, xxi. Pt. 2, p. 146.

The *supra-antennal plates* are behind the wings of the clypeus and project beyond them; when longitudinally sulcate before the eyes the part outside this *preocular sulcus* may be called the *preocular process*.

The *suborbital channels* are below the eyes; they receive the basal part of the antennæ when laid back.

SCARAPHITES GIGAS, Castelnau.

I formerly regarded *Sc. gigas*, Cast., as in all probability a synonym of *Sc. laticollis*, MacL.; but Mr. C. French has in his collection a species from N.W. Australia which is evidently *Sc. gigas*, and which, though closely allied to *Sc. laticollis*, differs from that species by the following characters:—Form proportionately broader and heavier; head similar, but with mentum less concave in front of submentum; prothorax broader (9×18 mm.), more deeply emarginate in front, anterior angles similar but more prominent, sides sloping more decidedly backwards to posterior angles, these less marked; elytra broader (22×18 mm.), less parallel, evidently wider behind middle, more convex, more abruptly declivous to apex, sides more strongly rounded, lateral margins wider.

Length 44, breadth 18 mm.

EURYSCAPHUS WATERHOUSEI, MacL.

E. waterhousei, MacL., seems to have a very wide range and varies greatly in size, so much so, indeed, that it is probable *E. attratus*, Sl., may prove to have been founded on a small form of *E. waterhousei*.

Length 35-50, breadth 15-24 mm. (from specimens in my possession.)

Hab.—MacDonnell Ranges (Spencer); Barrow Creek, Northern Territory of South Australia (Coll. French); Lake Darlott (Murchison Goldfield District), West Australia (Coll. Froggatt).

EURYSCAPHUS EBENINUS, Sloane.

This species is widely distributed in West Australia, and varies greatly in size and appearance. Like the eastern species *E.*

obesus, MacI., the male has the elytra much more circular in shape, and more emarginate at the base than the female. Its constant characters are the lobate prothorax and bipunctate elytra.

The dimensions from a number of specimens before me may be given as follows :—

♂. Length 34.42, breadth 16.19.5 mm.

♀. „ 37.44 „ 16.5-17.5 mm.

Hab.—Yilgarn, Coolgardie, Murchison District (on authority of Mr. French); Kalgoorlie (G. W. Froggatt).

LACCOPTERUM SPENCII.

Carenum spencii, Westw., Ann. Nat. Hist. 1841, p. 123; Arcan. Ent. i. p. 85; *C. digglesii*, MacI., Trans. Ent. Soc. N.S.W. 1873, ii. p. 326.

I have no doubt that Sir William Macleay bestowed the name *Carenum digglesii* on the species that Westwood had previously named *C. spencii*.

Hab.—Queensland (Brisbane?).

LACCOPTERUM MACLEAYI, n.sp.

Carenum spencii, Macleay (*non* Westwood).

Black. Robust, subparallel; prothorax with anterior angles advanced, base widely lobate; four rows of large deep round foveæ on each elytron; anterior tibiæ tridentate.

Head transverse-quadrate (3×4.3 mm.), convex; frontal sulci short, deep, sinuous, hardly divergent backwards, connected behind by a rounded impression; occipital area of head depressed below plane of front; eyes convex, not prominent; two supraorbital punctures on each side. Prothorax transverse (3.7×5.5 mm.); sides almost parallel (very lightly rounded in middle) before posterior angles; anterior angles advanced, obtuse; posterior angles rounded, lightly marked; a light sinuosity on each side behind posterior angles; base wide, rounded; border thick, reflexed on sides, wider at posterior angles, hardly at all reflexed on base; median line shallow, linear; a light transverse impression defining the small basal area; three marginal punctures on each

side. Elytra suboval (8×5.6 mm.), widest behind middle, a little narrowed to base, depressed on disc, very declivous to apex; sides lightly rounded; base lightly emarginate, shoulders marked; four regular rows of large round foveæ—besides those of lateral channel—on each elytron, foveæ of sutural row smaller than others; a row of ocellate punctures placed in foveiform depressions in the wide lateral channel.

Length 12.5-17.5, breadth 4.2-5.7 mm. (Type 17 mm. in length.)

Hab.—N.S. Wales, Wingelo (Stephens), Goulburn, June, Narrandera and Mulwala (Sloane).

This is the species which was regarded by the late Sir William Macleay as *C. spencii*, Westw.; it is so named in his collection and all references to *C. spencii*, as a species known to him, in his papers on the Carenides, must be considered as referring to it.

This species has been represented in my collection for many years, and never since comparing it with Westwood's description and figure of *C. spencii* have I been able to accept Sir William Macleay's identification as correct, or regard it as the species which Westwood had before him; but it is only recently that I have been able to identify the true *C. spencii* from specimens supplied to me by Mr. C. French under the name of *C. digglesii*, Macl. An examination of these specimens shows them to agree perfectly with both Westwood's description and figure of *C. spencii*, and leaves no doubt in my mind as to their being Westwood's species.

Comparing *L. macleayi* with *L. spencii* the conspicuous difference is in the sculpture of the elytra; in *L. spencii* the elytra are more rounded on the sides, the first interstice is flat and closely transversely striolate without the large foveæ of *L. macleayi*, the lateral channel is smooth with its row of ocellate punctures not placed in foveæ. *L. salebrosum*, Macl., has the elytra with the first interstice similar to that of *L. spencii*, but the foveæ of the elytra, though their general arrangement is in three rows, are more numerous, irregularly shaped and confused in the two outer rows. *L. macleayi* exactly resembles *L. foveipenne*, Macl., in all respects

excepting the blue margin to the prothorax and elytra, and the blue reflection at the bottom of the foveæ of the elytra.

CARENUM REFLEXUM, n.sp.

Elliptical, subdepressed, lævigata; head large, obliquely narrowed on each side behind eyes, suborbital channel single; prothorax transverse-quadrate, posterior angles widely reflexed and strongly marked; elytra elongate-cordate, impunctate, inflexed margins wide; anterior tibiæ bidentate. Black, prothorax and elytra with subviolaceous margins.

Head widely transverse (3.5×6 mm.), rather depressed; frontal sulci strongly impressed, long, diverging lightly backwards; space between sulci lightly convex; clypeus with median part wide, feebly emarginate; preocular sulcus wide, hardly marked; preocular process small, rounded; eyes convex, deeply enclosed posteriorly; orbits obliquely narrowed to neck; one supraorbital puncture on each side. Antennæ subfiliform, lightly compressed, apical joint oval. Prothorax transverse (4.3×7.3 mm.), lightly convex; sides lightly rounded (hardly narrowed anteriorly, very lightly narrowed posteriorly); anterior margin widely emarginate; anterior angles advanced, widely rounded; posterior angles subrectangular, obtuse at summit; base truncate on each side, widely sublobate in middle; basal lobe widely emarginate-truncate; a light wide sinuosity at each side of basal lobe; border widely reflexed, widened at anterior angles, dilatate and very widely upturned at posterior angles, narrowly reflexed on middle of base; median line lightly impressed; lateral channel impunctate; inflexed margins projecting sharply from episterna. Elytra same width as prothorax (10×7.3 mm.), widest about middle, widely truncate-emarginate at base, narrow at apex; sides lightly rounded, hardly narrowed to shoulders; humeral angles rounded; margins wide; border reflexed, most strongly so near shoulders, passing round humeral angles and widely and lightly upturned on each side of base just within humeral angles; a row of rather widely separated ocellate punc-

tures along lateral channel; two punctures on each side of basal declivity. Legs as in *C. ineditum*, MacI.

Length 20, breadth 7.3 mm.

Hab.—Australia (Coll. French).

A very remarkable and isolated species; its affinity is evidently towards *C. ineditum*, with which it agrees in shape of head, palpi, and legs. It cannot be placed with *C. transversicollis*, Chaud., on account of its bidentate anterior tibiae.

CARENUM OCCIDENTALE, n.sp.

Robust, convex, lævigate; frontal sulci almost parallel; prothorax widely transverse, shortly lobate, anterior angles porrect; elytra impunctate, inflexed margins wide; anterior tibiae tridentate. Black, shining, prothorax and elytra margined with green.

Head transverse, quadrate (5×7.5 mm.), convex across occiput, subdepressed anteriorly; frontal sulci subparallel, hardly diverging backwards, curving outwards anteriorly in a distinct linear course; preocular sulcus short, deep, straight; preocular process narrow; eyes round, not prominent, deeply set in head; one supraorbital puncture on each side. Antennae rather stout, subfiliform, lightly compressed, apical joint short. Prothorax convex, widely transverse (5.3×9.5 mm.), of same width between posterior angles as between anterior angles, smooth (disc feebly transversely striolate); sides lightly rounded, anterior margin truncate between anterior angles, these strongly and obtusely advanced; posterior angles rounded, but prominent; base shortly lobate, truncate on each side of lobe; basal lobe short, rounded; border reflexed, wide on sides, very wide at posterior angles, narrower on basal lobe; marginal channel wide on sides, entire on base; median line well marked, linear; two marginal setigerous punctures on each side. Elytra oval, hardly wider than prothorax (13.5×9.7 mm.), smooth, convex, deeply declivous to apex; border narrow, reflexed, lightly folded over (not prominent) at humeral angles; margin wide; a row of four punctures on base of each elytron; a row of ocellate punctures along margin; suture strongly impressed. Anterior tibiae tridentate; intermediate tibiae incrassate with a very short

stout triangular projection externally at apex; posterior tibiæ light, slightly incrassate.

Length 26, breadth 9·7 mm.

Hab.—West Australia, Murchison District (Coll. French).

Allied to *C. transversicollis*, Chaud., but larger and margined with green instead of blue; also allied to *C. frenchi*, Sl., from which its wider shape and green margin will help to distinguish it. The type specimen was sent to me by Mr. French as coming from Cue; it seems widely spread in the Murchison District, W.A.

CARENUM CORDIPENNE, n.sp.

♂. Elliptical-oval, robust, lævigata; head large; prothorax transverse, widely rounded behind, two marginal punctures on each side; elytra wide, cordate, subdepressed, impunctate; anterior tibiæ bidentate. Black, margins of prothorax and elytra bluish.

Head transverse (4·4 × 6·5 mm.), frontal sulci deep, diverging backwards; clypeus with median part truncate; preocular sulcus well marked, wide; preocular process small, rounded externally; eyes convex, prominent; two supraorbital punctures on each side; genæ setigero-punctate. Prothorax transverse (5 × 7·8 mm.), lightly convex, a little declivous to base; basal area small, defined by a transverse impression; sides rounded, subparallel in middle; anterior margin truncate between anterior angles, these advanced, obtuse; basal curve rotundate, lightly trisinate in middle; border wide, reflexed, more strongly reflexed behind posterior marginal puncture; median line lightly impressed. Elytra wide, cordate (10·5 × 8 mm.), lightly depressed; base wide, lightly emarginate-truncate; margin wide; border reflexed; four punctures in a row on each side of basal declivity; a row of rather widely placed punctures along lateral margins. Base of intercoxal part of prosternum truncate, and with one setigerous puncture on each side. Legs light.

Length 21-26, breadth 7·6-9 mm.

Hab.—Victoria, North-western District.

Six specimens (all males) have been sent to me by Mr. C. French; four of these taken at same place and time represent

the typical form, the other two differ slightly in facies; one has the elytra a little wider, more convex and more decidedly emarginate at base, the other has the elytra more convex with the suture strongly impressed and the prothorax more truncate across the middle of the base; both agree with the type in every other respect.

Closely allied to *C. lævipenne*, Macl.; The head is similar, but has two supraorbital punctures on each side* and one or more setigerous punctures on the genæ below the antennal scrobes; the antennæ are a little more slender, the apical joints being longer; the prothorax hardly differs in shape, but is a little less rounded on the middle of the sides and less evenly rounded on the basal curve; it has two marginal punctures on each side (*C. lævipenne* has none); the elytra are flatter, shorter and more cordate (the sides more strongly rounded backwards from the shoulders); the more depressed disc gives the base a more emarginate appearance. *C. cordipenne* also differs from *C. ineditum*, Macl., by all the characters given above.

CARENUM BREVIFORME, Bates. .

Prothorax and elytra margined with green, head and prothorax wholly black beneath, elytra with disc purple-black (the green margin very wide, reaching to discoidal apical punctures).

Closely allied to *C. virescens*, Sl.; the following differences may be noted:—Elytra with disc deep purple-black not overspread with green; the lateral punctures of clypeus giving off a sulcus which reaches anterior margin at inner side of base of intermediate projections; sides of head less abrupt (lightly and evenly rounded) above eyes; prothorax shorter, posterior angles more strongly marked; elytra shorter, less narrowed to humeral angles, these more rounded and less marked.

* Specimens of *C. lævipenne* sent me by Mr. A. M. Lea from Mt. Barker, W.A., have one supraorbital puncture on each side; another specimen is in my collection without any supraorbital puncture.

Length 18, breadth 6.75 mm. (Head 3.4×5.3 , prothorax 3.8×6.75 , elytra 9×6.75 mm.).

Hab.—Roebuck Bay, W.A. (sent to me by Mr. C. French).

CARENUM FROGGATTI, n.sp.

Small, light, lævigata; head depressed, frontal sulci lightly divergent, suborbital channel single; prothorax transverse, shortly lobate, anterior angles strongly advanced, lateral margins bipunctate; elytra suboval, convex, bipunctate towards apex; anterior tibiæ bidentate, posterior tibiæ slender. Head and undersurface black; prothorax widely margined with green, disc deep purple-black; elytra violet with green reflections, becoming green near margins; inflexed margin of prothorax and elytra virescent; antennæ and legs piceous-black, palpi piceous-brown.

Head transverse (2.5×3.8 mm.), depressed, smooth; margin on each side between anterior angles and intermediate angles of clypeus forming a long oblique slope; frontal sulci rather short, diverging lightly backwards; anterior part of their course strongly marked, curving sharply outwards; clypeus deeply emarginate-truncate in middle, intermediate angles wide, obtuse, not dentiform; preocular sulcus deeply marked, short, straight; preocular process small, rounded externally; eyes convex, prominent, rather deeply set in orbits posteriorly; orbits oblique (not protuberant) behind eyes; one supraorbital puncture on each side. Antennæ slender, compressed. Prothorax transverse (3.2×5 mm.), convex, strongly declivous to base; sides lightly rounded; posterior angles rounded; anterior angles strongly advanced, roundly obtuse; base decidedly lobate; basal lobe rounded; a strong sinuosity on each side of basal lobe; border reflexed, wide from anterior angles to behind posterior angles, more strongly upturned at posterior angles; median line lightly marked. Elytra ovate (8×5.5 mm.), a little narrowed to base; apical curve narrow; sides rounded; base truncate, deeply and obliquely declivous; lateral channel wide; border reflexed, forming a short wide upturned prominence at humeral angles; a row of ocellate punctures along margin; inflexed margins wide. Prosternum

with intercoxal part deeply channelled, truncate at base; one setigerous puncture on each side of base. Legs light; anterior tibiæ slender, tridentate, the teeth light, two fine external teeth above the large ones.

Length 15, breadth 5.5.

Hab.—West Australia, Kalgoorlie (G. W. Froggatt; Coll. Froggatt).

This species is characterised by its small size and slender posterior tibiæ. Following the distribution of the species of *Carenum* into groups adopted by me in P.L.S.N.S.W. viii. (2), pp. 462, 466, its place would be with *C. habitans*, Sl., though it is evidently quite as nearly allied to the *C. elegans*-group, and indicates that these two groups should be united. It has some affinity to *C. rugatum*, Blkb., but can be distinguished at once from it by the less prominent angles of the head, and by the absence of an oblique longitudinal sulcus extending backwards from above the eyes on each side of the head.

I form a new group to receive *Carenum rugatum*, Blkb., and *C. sulcaticeps* (n.sp.), to be called the *sulcaticeps*-group. It has seemed to me that the usual course of giving the name of the species first described to the group cannot be adopted in this case, because the name *rugatum* would be misleading if applied to a group of species naturally lævigata. The *sulcaticeps*-group will be distinguished by the following characters:—Head with frontal sulci short, subparallel, suborbital channels straight, single, an oblique supraorbital sulcus on each side of the occiput; anterior tibiæ tridentate. It may be noted that all the specimens of this group which I have examined have had two punctures on the anterior tibiæ near the lower margin of inner side towards apex.

CARENUM SULCATICEPS, n.sp.

Oblong-oval, lævigata; head with an oblique supraorbital sulcus on each side, anterior angles prominent; prothorax lightly lobate; elytra bipunctate towards apex; anterior tibiæ tridentate. Shining; head, disc of prothorax, undersurface and legs black;

elytra chalybeous with purple reflections; prothorax with pale bluish margins, sides of disc flushed with purple.

Head transverse (3.5×5.3 mm.), depressed; frontal sulci short, subparallel; clypeus with median part truncate, intermediate angles prominent, anterior margin of wings oblique; preocular sulcus short, wide; preocular process small, prominent; eyes convex, not prominent, deeply embedded in orbits posteriorly; postocular part of orbits defined above and below by a strong sulcus and sloping gently to head; one supraorbital puncture on each side. Prothorax transverse (4.5×7 mm.), convex; sides rounded, strongly and roundly narrowed anteriorly; posterior angles rounded (lightly marked); anterior angles lightly and obtusely advanced; middle of base rounded, a wide light sinuosity on each side of basal lobe; border reflexed (slightly more so at posterior angles); lateral channel wide; median line lightly impressed; two marginal punctures on each side. Elytra ovate (11×7.7 mm.), convex; sides rounded; border reflexed, lightly and widely upturned at humeral angles; about four punctures on basal declivity of each elytron. Legs light.

Length 17.23, breadth 6.3-8.4 mm. (Type 21 mm. in length).

Hab.—Nullabor Plains (near Eucla). Given to me by Mr. C. French.

Allied to *C. rugatum*, Blkb., of which I had formerly regarded it as a variety, but now consider it distinct on account of its metallic colour and apparently wider form. *C. sulcaticeps* and its allies seem to vary greatly in colour and facies, in this resembling *C. laevigatum*, MacL., and its allies. I am puzzled among the specimens before me, and evidently it will only be possible to arrive at definite conclusions as to which forms constitute species, and which varieties, after the range and constancy of each form has been determined by collecting widely in South-west Australia and carefully recording the localities of specimens.

The type of *C. sulcaticeps* (♀) has the elytra convex, with the suture not placed in a channel; another specimen (♀) is wider and more robust and has the suture placed in a light channel on the disc; a third specimen (sex undetermined) has the suture

placed in a deep wide channel, as has also the only male specimen (length 17 mm.) I have.

A specimen from same locality differs from the type and may be called :—

Var. A. ♀. Differs from type by more elongate shape, elytra longer and more depressed, colour duller; this form approaches *C. rugatum*, Blkb. Length 24, breadth 8.4 mm.

Two other *Carenum*s are in my collection; probably each represents an undescribed species, but at present I place them under *C. sulcatipes* as varieties.

Var. B. Differs from type by having the elytra bright metallic-purple (the disc of the prothorax also flushed with purple), the prothorax more strongly lobate on base and with the anterior angles more porrect. Length 17.5, breadth 6.5 mm.

Hab.—Norseman Diggings, W.A. (Received from Mr. French).

Var. C. Differs from type by being narrower and more convex; prothorax more strongly lobate; prothorax and elytra widely margined with green. Length 17, breadth 6.2 mm.

Hab.—South Australia. (Received from Mr. G. Masters).

A separate group may be formed for *Carenum planipenne*, MacI., and closely allied species; this *planipenne*-group will precede the *marginatum*-group, from which it will be separated by the presence of a *supraorbital sulcus on each side of the occiput*; the inferior ridge of the anterior tibiae approaches the form found in the *dispar*-group, being more strongly serrate than in typical members of the *marginatum*-group. The species comprised in the *planipenne*-group number three,* viz., *C. planipenne*, MacI., *C. vicinum*, Sl., and *C. purpureum*, n.sp.

CARENUM PURPUREUM, n.sp.

Lævigate, form light, depressed; head as in *C. planipenne*, MacI., (suborbital channels single); prothorax as in *C. planipenne*;

* Possibly *C. carbonarium* may also be a member of this group, *vide post*, p. 204.

elytra ovate, bipunctate on apical half, inflexed margins wide behind first ventral segment; anterior tibiæ bidentate. Head and under surface black, prothorax shining black with wide violaceous margins, elytra shining violet-purple (inflexed margins metallic).

Head light, subquadrate (3.2×4.5 mm.), rather depressed; frontal sulci sinuate, very lightly divergent posteriorly, a wide curved impression connecting their extremities, their anterior out-turned part very lightly marked; preocular process small, prominent; eyes convex, strongly enclosed behind; a sulcus above eye, becoming wider and curving downward behind orbit; two supraorbital punctures on each side. Prothorax transverse (4.2×6 mm.), lightly convex, declivous to base; a well-defined depressed space before basal margin; sides rounded; posterior angles not marked; anterior angles lightly advanced, obtusely rounded; border wide, reflexed, strongly sinuate and widened to form prominent angles on each side of base, passing round anterior angles; base rounded on each side and emarginate in middle; a short wide oblique impression on each side of posterior declivity half-way between median line and basal angles; median line strongly impressed; three marginal punctures on each side. Elytra ovate, a little broader than prothorax (9×6.3 mm.), depressed, lightly declivous to apex; base truncate; sides strongly rounded, narrowed to base; border narrow, reflexed, lightly upturned at humeral angles; a row of fine punctures along marginal channel; four fine punctures in a single row on base of each elytron. Legs as in *C. planipenne*.

Length 19.5, breadth 6.3 mm.

Hab.—South Australia (Colls. French and Sloane).

Allied to *C. planipenne*, from which it differs by colour, smaller size, the much less erect elevation of the border of the elytra at the humeral angles, &c. From *C. fugitivum*, Blkb., it appears to differ by the shape of the posterior part of the prothorax, and it most probably has the elytra flatter and less shortly rounded at the humeral angles. It resembles *C. vicinum*, Sl., from which

the following are characters that distinguish it:—Size smaller; elytra wholly of a bright metallic violet colour; prothorax with three (not two) marginal punctures; elytra more depressed, more rounded on the sides and more narrowed to the base, with the humeral angles less erect.

Before describing the new species to be added to the group of which *Carenum marginatum*, Boisd., is the type, it has seemed advisable to review the described species of the group as well as the present state of my knowledge will allow. It should be noted that in some species of this group, and in other allied species, there is a considerable difference between different specimens in the appearance of the dorsal surface of the elytra; some specimens have the suture lightly impressed and not placed in a channel, so that the elytra are not separately convex, while in other specimens the suture forms a deep channel and each elytron is separately convex. I had thought this was a sexual difference and that the deeply impressed suture was a character of the male, but though, generally speaking, this seems to be the case, it does not appear, from the evidence on the subject I have been able to obtain, to be an invariable rule; it is a subject requiring further investigation.

Four species formerly attributed to the *marginatum*-group should certainly be removed from it, viz. :—*C. striato-punctatum*, MacL., *C. planipenne*, MacL., *C. subplanatum*, Bates, and *C. batesi*, Masters. This leaves twenty species in the group which may be divided into two sections according as their colour tints are green or blue; the species of each section are arranged below in the order of their priority.

SECTION I.—SPECIES THE COLOUR TINTS OF WHICH ARE GREEN.

C. marginatum, Boisd.

C. viridi-marginatum, MacL.

C. laterale, MacL.

C. terræ-reginæ, MacL.

C. subcostatum, MacL.

C. imitator, Sl.

SECTION II.—SPECIES THE COLOUR TINTS OF WHICH ARE BLUE
(OR VIOLET).

<i>C. lævigatum</i> , Macl.	<i>C. propinquum</i> , Macl.
<i>C. puncticolle</i> , Macl.	<i>C. nitescens</i> , Macl.
<i>C. murrumbidgeuse</i> , Macl.	<i>C. ianthinum</i> , Macl.
<i>C. subporcatulum</i> , Macl.	<i>C. fugitivum</i> , Blkb.
<i>C. convexum</i> , Chaud.	<i>C. decorum</i> , Sl.
<i>C. kingi</i> , Macl.	<i>C. amplicolle</i> , Sl.

Two species, viz., *C. carbonarium*, Casteln., and *C. politulum*, Macl., are omitted from the above list; *C. carbonarium* because I do not feel sure that it should not be placed in the *planipenne*-group; *C. politulum* because its colours are described as "glossy black tinged with blue on the elytra," and with a "green margin to both thorax and elytra," and therefore does not seem in place either in the "green" or "blue" section.

CARENUM LATERALE, Macl.

I am doubtful if this species is really distinct from *C. marginatum*, Boisd. A specimen (evidently ♀) is in my collection, sent by Mr. W. S. Duncan from Inverell, N. S. Wales; comparing it with specimens of *C. marginatum* from near Sydney the only differences noticeable are the more rounded posterior angles of the prothorax and the lighter sinuosities on each side of the base, and on the middle of the base.

CARENUM VIRIDIMARGINATUM, Macl.

Of the two type specimens in the Australian Museum one is *C. subporcatulum*, Macl.; the other seems a different species nearly allied to *C. marginatum*, Boisd., and requiring further examination.

CARENUM LÆVIGATUM, Macl.

C. lævigatum, Macl., Trans. Ent. Soc. N.S.W. 1863, i. p. 131; *C. frontale*, Macl., l.c. p. 185; *C. schomburgkii*, Casteln., Proc. Roy. Soc. Victoria, 1867, viii. p. 137.

I have compared the type specimens of *C. lævigatum* and *C. frontale* in the Macleay Museum, and consider them to be the same species.

CARENUM MURRUMBIDGENSE, Macl.

C. punctulatum, Macl., Trans. Ent. Soc. N.S.W. 1865, i. p. 143;
C. murrumbidgenae, Macl., l.c. p. 183.

After comparing the type specimens of *C. punctulatum* and *C. murrumbidgenae* in the Macleay Museum I have no doubt they are synonymous. The rows of fine punctures on the elytra from which *C. punctulatum* derives its name are certainly a *post mortem* effect caused by submersion in alcohol; therefore, though this name has a priority of about twelve months over *C. murrumbidgenae*, I think it should be discarded. It is probable that *C. murrumbidgenae* is not actually a species distinct from *C. lævigatum*, but I hesitate to unite them on the evidence in my possession, though I do not know any characters that differentiate them.

CARENUM PUNCTICOLLE, Macl.

This species is very close to *C. lævigatum*.

CARENUM KINGI, Macl.; and *C. PROPINQUUM*, Macl.

It is doubtful if there is any actual difference between these species, which are very closely allied to *C. murrumbidgenae*. I have not examined the types carefully, but have noted that the single type specimen of each in the Macleay Collection is without supraorbital punctures on the sides of the head.

CARENUM CONVEXUM, Chaudoir.

I have not satisfactorily identified this species; it is evidently very closely allied to *C. ianthinum*, Macl., and indeed seems to me not unlikely to be that species.

CARENUM IANTHINUM, Macl.

I regard a species sent to me by the late Mr. G. Barnard from Duaringa, Queensland, as this species. It is allied to *C. lævi-*

gatum, but is more convex, and has the elytra suffused with purple.

CARENUM SUBPORCATULUM, Macl.

I found this species at Finche's Creek, 40 miles from Dalby in the Darling Downs District, Queensland; and have compared my specimens with the type specimens of *C. subporcatulum*. It is a lævigata species; the sculpture of the elytra alluded to in the original description may be looked upon as a *post mortem* effect caused by submersion in alcohol; the prothorax and elytra become violaceous near the sides of the disc, the margins being pale blue.

CARENUM POLITULUM, Macl.

The description of this species reads as if founded on specimens of *C. subporcatulum*; it requires further examination.

CARENUM CARBONARIUM, Castelnau.

The description of this species seems to be founded on a species closely allied to *C. vicinum*, Sl. It is possible the difference in colour may be only a variation, and that these species are synonymous, but specimens from Esperance Bay will have to be examined before this can be settled.

CARENUM IMITATOR, n.sp.

Elliptical-oval, robust, lævigata; elytra bipunctate posteriorly, inflexed margins wide; anterior tibiæ bidentate. Black, shining; prothorax and elytra margined with green—a green tinge pervading all the lateral declivities of elytra.

Head large, transverse (3.7×6 mm.), subdepressed; frontal sulci deep, diverging backwards and curving outwards to define posterior margins of spaces between frontal sulci and eyes, their anterior part curving outwards in a deeply marked course; spaces between frontal sulci and eyes very convex; preocular sulcus deep, wide; two widely placed supraorbital punctures on each side. Prothorax transverse (5.5×7.9 mm.), convex; sides rounded; basal curve subrotundate (trisinuate); anterior margin emarginate; anterior angles widely and decidedly advanced;

posterior angles rounded; border widely reflexed, strongly sinuate behind each posterior angle and in middle of base; median line well marked. Elytra widely oval (11.5×8.5 mm.), truncate between humeral angles; margin wide; border reflexed, rather widely folded backwards and upwards at humeral angles; marginal channel terminating abruptly at humeral angles. Legs and under surface as in *C. marginatum*, Boisd.

Length 24, breadth 8.5 mm.

Hab.—Victoria; Wimmera District. (Sent to me by Mr. C. French).

This species resembles *C. marginatum* so closely that it can hardly be distinguished from it, but is nevertheless distinct. I note the following differences from *C. marginatum*:—Its more shining colour; elytra with greenish reflections—except in middle of disc, the basal declivity and inflexed margins of elytra green; preocular sulcus more deeply impressed; preocular process larger; eyes less convex and less strongly enclosed by the orbits; sides of the head more abrupt above the eyes; two supraorbital punctures on each side of head; prothorax with the sides more evenly rounded, the base wider, the posterior sinuosities more marked; elytra much wider at apex, the marginal channel wider and closed at humeral angle by a short ridge that crosses it and connects the folded humeral border with the disc of the elytra; in *C. marginatum* the elytra are declivous to the humeral angles and the marginal channel is not closed by a ridge.

CARENUM AMPLICOLLE, n.sp.

Robust, convex; head large; prothorax transverse; elytra subcordate, narrower than prothorax, bipunctate on apical third; anterior tibiae bidentate. Black, opaque; prothorax and elytra with narrow and obscure bluish margin.

Head transverse (3.4×5.2 mm.), strongly declivous on each side to eyes; frontal sulci deep, lightly divergent backwards; the space between them rounded posteriorly and raised above the plane of the occiput; preocular sulcus well marked; preocular process narrow, not prominent; eyes convex, prominent, strongly

enclosed behind; one supraorbital puncture on each side. Prothorax transverse (4.5×7 mm.), narrowed to apex; sides rounded; posterior angles rounded; basal curve subsinuate on each side of middle, strongly sinuate in middle; anterior margin emarginate; anterior angles decidedly and obtusely advanced; border wide, reflexed; marginal channel wide, impunctate. Elytra subcordate (9×6.5 mm.); widest about anterior third; sides rounded, decidedly so to shoulders; base declivous, subemarginate behind peduncle; margin wide; border reflexed, folded back erect and closing marginal channel at humeral angles. Legs as in *C. lævigatum*, Macl.

Length 19, breadth 6.5 mm.

Hab.—Victoria.

Allied to *C. lævigatum*, from which it differs conspicuously in facies; the prothorax is wider than the elytra, more strongly and roundly narrowed to the anterior angles; the elytra are shaped as in *C. lævipenne*, Macl., being subcordate, the base feebly emarginate, the sides less rounded and the apex more narrowed than in *C. lævigatum*, the punctures of the lateral channel are wider apart, especially near the shoulders, and the base of each elytron has only one puncture in the middle of the declivity. A second specimen belonging to Mr. French differs slightly from the type in shape, the elytra being just a shade wider than the prothorax, less declivous on the sides, more widely rounded at the apex, the suture less strongly impressed, the prothorax a little less transverse and less strongly rounded on the sides, especially towards the anterior angles; it is probable this is the ♀ and the typical form the ♂. Specimens were sent to me by Mr. French labelled Victoria.

CARENUM VERSICOLOR, n.sp.

Elliptical-oval, lævigate; head moderate, eyes prominent; prothorax transverse; elytra ovate, bipunctate posteriorly; anterior tibiæ bidentate. Head, legs and under surface (generally) black; prothorax with wide greenish-blue margins (with reflected purple tints in changing light), disc purple-black; elytra entirely of a metallic greenish-blue colour (becoming violaceous in changing

light), inflexed margins bluish-green; sides of prosternum flushed with blue, point of prosternum between coxæ, sides of metasternum and posterior coxæ bluish.

Head smooth, transverse (3×4.5 mm.), lightly transversely impressed across vertex; facial sulci long, deep, diverging backwards; preocular sulcus lightly marked, wide; preocular prominence small; eyes convex, very protuberant, deeply enclosed in orbits at base; orbits short behind eyes, projecting strongly from head; two supraorbital punctures on each side. Prothorax transverse (4×5.4 mm.), convex; sides rounded; anterior margin widely emarginate; anterior angles wide, obtuse, prominent; posterior angles not marked; basal curve trisinate, a well-marked sinuosity at middle and a lighter sinuosity on each side half-way between middle of base and posterior marginal puncture; border wide, reflexed; median line well marked; two marginal punctures on each side. Elytra ovate (8×5.8 mm.), convex; anterior part of disc rather depressed; suture strongly impressed; base truncate; sides rounded; border wide, shortly upturned at humeral angles; five punctures in a single row at base of each elytron. Prosternum deeply channelled between coxæ. Legs as in *C. lævigatum*, MacL.

Length 16.5, breadth 5.8 mm.

Hab.—Victoria, North-west (Mallee) District (Coll. French).

A single specimen of this pretty species was sent to me for description by Mr. French after my notes on the *marginatum*-group were completed; it is differentiated from all the other species of this group by its colour, and is the only member of the group known to me to have any bluish tints on the under surface.

CARENUM OPACICOLLE, n.sp.

Robust, subdepressed; head depressed, suborbital channels wide and divided posteriorly by a longitudinal ridge; prothorax with three marginal punctures on each side; elytra quadripunctate on apical third, inflexed margin wide behind first ventral segment, border folded back and forming a short obtuse projection at shoulders; anterior tibiæ bidentate, intermediate tibiæ with external apical spur very small, slender, acute; labial palpi with

penultimate joint stout, not longer than apical joint. Black, opaque, marginal channel of prothorax dull bronze, of elytra greenish-bronze.

Head transverse (3.3×5.5 mm.), frontal sulci strongly impressed, diverging backwards and defining posterior margin of spaces between sulci and eyes; space between frontal sulci rounded on base and not filling all the interval between their posterior extremities; preocular sulcus well marked; preocular process small; eyes convex, deeply embedded in orbits; a well marked oblique impression dividing submentum from genæ on each side; two supraorbital punctures on each side. Antennæ short, moniliform; joints 5-10 short, very depressed. Prothorax transverse (4.5×7 mm.), hardly declivous to base; a small basal area defined by a transverse impression; sides lightly rounded, decidedly rounded to anterior angles; these wide, obtuse, lightly advanced; posterior angles not marked; basal curve oblique (very widely and lightly sinuate) on each side of middle, rounded in middle, border thick, lightly explanate at anterior angles, a little more prominent at posterior angles, median line strongly impressed. Elytra short (9.5×7 mm.), truncate at base, widely rounded at apex, strongly rounded on sides (seven shallow crenulate striæ on each elytron of specimen before me), each elytron bipunctate posteriorly, the anterior of these punctures placed about middle of width at beginning of apical declivity, the other half-way between it and apex. Prosternum widely channelled between coxæ, a setigerous puncture on each side of base. Ventral segments convex, bipunctate.

Length 20, breadth 7 mm.

Hab.—Queensland; Cardwell (Coll. French).

The affinity of this species as disclosed by the form of the suborbital channels, the three marginal punctures of the prothorax, the wide inflexed margin of the elytra, and the form of the palpi and legs, is to *C. interruptum*, MacL. It is the only species without discoidal punctures on the anterior part of the elytra presenting all these features that I have seen. Probably it comes nearer *C. subcostatum*, MacL., than any other described species, and fresh specimens would probably show obsolete striæ

and minute scratches on the elytra as in that species. *C. subcostatum* shows a faint trace of the longitudinal ridge of the sub-orbital channels, but has only two marginal punctures on each side of the prothorax. The four apical punctures of the elytra in *C. opacicolle* are a remarkable character for a *Carenum*.

CARENUM INTERRUPTUM.

C. interruptum, MacL., Trans. Ent. Soc. N.S.W., 1866, i. p. 181; *C. obscurum*, MacL., l.c. p. 182; *C. castelnauvi*, Chaud., Ann. Soc. Ent. Belg., 1869, p. 141; *C. sexpunctatum*, MacL., Trans. Ent. Soc. N.S.W., 1873, ii. p. 62; *C. occultum*, MacL., l.c. p. 97; *C. purpureo-marginatum*, MacL., Proc. Linn. Soc. N.S.W. 1887, ii. (2), p. 192; *C. arenarium*, Sl., l.c. 1888, p. 1114.

Since publishing my previous note on the synonymy of *Carenum interruptum*, MacL.,* I have examined the type specimen of *C. obscurum* in the Macleay Museum, and found it conspecific with *C. interruptum*.

CARENUM SCARITIOIDES.

C. scaritiodes, Westw., Arcan. Ent. i. p. 192; *C. intermedium*, Westw., Trans. Ent. Soc. 1849, v., p. 203; *C. atronitens*, MacL., Trans. Ent. Soc. N.S.W. 1866, i. p. 137; *C. oblongum*, MacL., l.c. p. 138; *C. nigerrimum*, MacL., l.c. p. 176; *C. striato-punctulatum*, MacL., l.c. p. 178.†

A comparison of specimens in my possession with the types of Macleay's species given above has convinced me that these are only synonyms of *C. scaritiodes*, Westw.; I also regard *C. intermedium*, Westw., as founded on the same species. The puncturation of the elytra in *C. striato-punctulatum* is certainly a *post mortem* effect.

Hab.—N.S. Wales, Victoria, South Australia.

* P.L.S.N.S.W. 1893, viii. (2) p. 473.

† *Carenum gawlerense* (Masters' Cat. Col. Sp. 7338). There is a specimen so named in the Macleay Museum; it is identical with *C. scaritioides*.

CARENUM VENUSTUM, n.sp.

Lævigata, elongata, convexa, parallel, disc of elytra depressed; head large, lightly transversely impressed posteriorly, suborbital channel divided longitudinally in middle by an oblique ridge; prothorax convex, a little broader than long, sinuate-angustate posteriorly; elytra bipunctate posteriorly, humeral angles erect, inflexed margin narrow behind first ventral segment; anterior tibiæ bidentate; intermediate tibiæ lightly incrassate, a slender elongate acute tooth externally at apex. Black, upper surface very highly polished, lower surface piceous; lateral channels of prothorax faintly tinged with blue; elytra subviolaceous, metallic purple on declivities of sides, apex and base.

Head lævigata, large (3.5×5 mm.), convex, declivous to anterior margin, lightly and widely impressed across middle behind frontal sulci; these sulci very deep, divergent; clypeus with median part trisinuate; preocular process small; preocular sulcus distinct, wide, shallow; eyes depressed, deeply embedded in orbits, hardly more prominent than preocular processes; orbits sloping gently to sides of head, not thick or prominent; two supra-orbital punctures on each side. Labrum trisinuate. Maxillary palpi with apical joint compressed, subsecuriform; labial with penultimate joint short, thick, apical joint very widely securiform. Antennæ light, not short, more slender to apex; joints 5-10 compressed, apical joint oval. Prothorax convex, a little wider than head (5×5.8 mm.), declivous to base; basal part depressed, defined by a straight transverse line; sides parallel, obliquely narrowed to base; posterior angles not marked; a wide light sinuosity a little before base on each side; basal angles hardly marked; base rounded; anterior margin truncate; anterior angles lightly marked, obtuse; border wide, reflexed, narrowed on middle of sides, widened at anterior angles, more widely reflexed behind posterior marginal puncture, thick on base; median line strongly impressed; a large round shallow fovea on each side a little before the basal angles; two marginal punctures on each side. Elytra of same width as prothorax (11×5.8 mm.), convex, depressed on

disc, deeply declivous on sides, strongly declivous on apex, truncate on base (lightly subemarginate); basal declivity deep and abrupt; sides subparallel, lightly rounded; lateral border wide, reflexed on anterior half, thick posteriorly, thickened and forming a short erect prominence at humeral angles; a row of separate ocellate punctures along the shallow marginal channel; a row of three or four punctures on outer side of base of each elytron; suture deeply impressed. Legs light; posterior trochanters acute at apex, impunctate; anterior femora rather long, not very wide or compressed, lightly channelled below; posterior femora with lower side roundly subangulate and punctate at apex of trochanters; anterior tibiæ as in *C. scaritioides*, Westw.

Length 21, breadth 5.8 mm.

Hab.—West Australia (Coll. French).

A very distinct species; the only described species to which it is closely allied is *C. batesi*, Masters (*C. planipenne*, Bates), with which it seems to agree in every character of structural importance, but *C. batesi* is described by Mr. Bates as being "olive-black with the margins of the thorax and the whole elytra clear green," and having the elytra "retuse at the base." I should not call the elytra of *U. venustum* retuse at the base, the top of the basal declivity being a gentle concave curve between the humeral angles, and I think *C. batesi* must be a species with the dorsal surface flattened as much as *C. pulchrum*, Sl. After seeing *C. venustum*, it becomes evident to me that Sir William Macleay was wrong in putting *C. batesi* in his "*marginatum*-group" of species, to which it seems to have no affinity; it should be placed with *C. venustum* in the same group as *U. sumptuosum*, Westw., and *C. quadripunctatum*, Maccl.; this group will therefore require to be modified in regard to the number of discoidal punctures on the elytra.

CARENUM ACUTIPES, n.sp.

Robust, convex, parallel, elongate; head large, suborbital channels obliquely divided by a strong ridge; prothorax hardly broader than long; elytra oval, humeral angles subdentate,

inflexed margin narrow behind first ventral segment;* anterior tibiae bidentate; posterior trochanters pyriform, produced at apex to a short acuminate point. Green, disc of prothorax and most of upper surface of head black; antennæ, legs and middle of under surface black.

Head very large (4.3×6 mm.), narrowed behind eyes, transversely impressed across occiput, convex, declivous to anterior margin; frontal sulci very deep, diverging strongly backwards, turning out anteriorly in a lightly marked course; space between sulci filling all the interval between their posterior extremities; median part of clypeus truncate, intermediate angles short, obtuse; preocular sulcus distinct, linear, extending backwards above eyes; preocular process wide, strongly declivous and rounded externally, two supraorbital punctures on each side. Mandibles very strong. Labrum roundly advanced in middle. Mentum and palpi as in *C. quadripunctatum*, MacL. Antennæ subfiliform, stout, compressed; apical joint elongate-oval. Prothorax convex, hardly broader than long (6×6.6 mm.), subparallel on sides, rounded at posterior angles, lightly angustate behind posterior angles; base wide, rounded; sides lightly rounded to anterior angles, shortly sinuate on each side of base; anterior margin truncate, with angles widely and very lightly advanced; basal angles roundly obtuse; border narrow, lightly reflexed, of even width on sides, thicker on base; marginal channel narrow; median line strongly impressed; two marginal punctures on each side; basal area of prothorax defined by a transverse impression; a wide oblique impression on each side of basal declivity. Elytra oval (13×7 mm.), lightly depressed on disc; base vertical above peduncle; margin narrow; border lightly folded over at humeral angles; four ocellate punctures in a cluster near each humeral

* The specimen before me is imperfect, the apical part of the elytra being broken off, but not in such a manner as to prevent a recognisable description of the species being made; there is a discoidal puncture on each elytron near the shoulder as in *C. quadripunctatum*, MacL., and I should expect the elytra to be quadripunctate as in that species.

angle in a depressed space above the basal declivity; a row of ocellate punctures along sides in the wide shallow marginal channel. Prosternum narrowly bordered along anterior margin; intercoxal part wide, lightly convex; rounded and bisetose at base. Legs long: anterior almost as in *Eutoma*, the femora longer and narrower; intermediate tibiae with a strong triangular external tooth at apex.

Length 25, breadth 7 mm.

Hab.—Cue, West Australia (Coll. French).

This is a species to which it is hard to assign an exact position among described *Carenums*; the head and prothorax present an evident likeness to those of *Eutoma*, but the antennæ are more elongate (not moniliform and incrassate), and their long apical joint is very different from the short one of *Eutoma*; the margins of the elytra are not thick as in *Eutoma*. In a general way it resembles a *Conopterum*, but, among other differences, has the border of the elytra thickened and folded over at the humeral angles. On the whole I think it must be placed with *Carenum quadripunctatum* and *C. batesi*, Masters (= *C. planipenne*, Bates); the description given above will prevent its being confused with any species yet attributed to the group of which *C. quadripunctatum* is the type, while evident characters of difference from *C. batesi* must be (a) the elytra with discoidal punctures near the base, (b) not retuse at base, (c) the shoulders not advanced, (d) the lateral margins not thickened as in *Eutoma*.

The apical joint of the maxillary palps is widely securiform, that of the labial very widely securiform; the antennæ have the joints glabrous on the compressed sides. The specimen described is the ♂; it is possible the pointed posterior trochanters may be peculiar to the ♂, as in some *Brosides* of the genus *Parroa*.

CARENUM PULCHRUM, n.sp.

Parallel, elongate, depressed, lævigata; head large, strongly transversely depressed at base; prothorax hardly broader than long, sinuate-angustate posteriorly, base widely lobate; elytra flat on disc, quadripunctate, inflexed margin very narrow behind first

ventral segment; anterior tibiæ bidentate, intermediate tibiæ incrassate with a strong triangular external tooth at apex. Shining; head, disc of prothorax and under parts black; elytra metallic purple, inflexed margins of a more dull purple; prothorax widely margined with purple; under surface of head faintly tinged with purple.

Head lævigata, large, widely convex (4×5 mm.), roundly and strongly declivous to anterior margin; occipital region strongly and sharply depressed below plane of vertex; frontal sulci very deep, divergent; space between them wide, convex; preocular process short, lightly protuberant, not so prominent as eye; preocular sulcus distinct, linear; clypeus with median part truncate; eyes depressed, deeply embedded in orbits, these thick and projecting beyond eyes; suborbital channel wide, divided posteriorly by a wide longitudinal ridge; two supraorbital punctures on each side. Maxillary palpi with apical joint subsecuriform; labial with penultimate joint short, thick, apical joint widely securiform. Antennæ stout, not short or incrassate; joints 5-10 short, greatly compressed, apical joint oval. Prothorax depressed, not perceptibly wider than head (5×5.3 mm.); sides subparallel in middle, lightly rounded in front, shortly and decidedly narrowed behind posterior angles, these wide; a decided sinuosity a little before base on each side; basal angles rounded; anterior margin truncate; anterior angles obtuse; border narrow, thicker and less reflexed on base, passing round anterior angles; median line strongly impressed; basal area wide, depressed, defined by a transverse impression between antebasal sinuosities. Elytra elongate-oval with base truncate, very little wider than prothorax (11×5.6 mm.), depressed, abruptly and roundly declivous on sides and apex, rather lightly declivous to peduncle; border narrow, lightly folded back and upturned at shoulders; anterior discoidal puncture a short distance behind humeral angle, posterior towards apex on upper part of marginal declivity nearer margin than suture; a row of umbilicate punctures along sides; some irregularly placed punctures on basal declivity. Anterior femora not wide as in *Eutoma*; posterior coxæ impunctate, posterior trochanters acuminate at apex.

Length 21, breadth 5.6 mm.

Hab.—West Australia (Coll. French).

This species is allied to *Eutoma magnificum*, Maccl., which it somewhat resembles in general appearance, and which has three marginal punctures on each side of the prothorax. I have not been able to compare it with *E. magnificum*, but have no doubt it is thoroughly distinct from that species. It shows affinities to *Conopterum*, *Neocarenum* and *Eutoma*; the upturned humeral angles prevent its being placed in *Conopterum*; it might be placed in either *Neocarenum* or *Eutoma*, and good reasons given for either assignment, but I prefer to put it in the genus *Carenum* taken in a wide sense.

EUTOMA GRATIOSUM, n.sp.

Elongate, parallel, lævigata; head large, convex; prothorax convex, deeply canaliculate, widely lobate at base; elytra twice as long as wide, disc impunctate, humeral angles widely upturned, a single large puncture at each humeral angle above basal declivity; anterior tibiæ bidentate. Shining; head black, purple posteriorly, gulæ purple; prothorax purple-black, widely margined with green; elytra bright metallic purple on disc, green towards sides, lateral borders piceous; under surface and legs piceous.

Head smooth, large (2.8×3.3 mm.), convex, roundly declivous to anterior margin, transversely impressed near base, narrowed behind eyes; frontal sulci strongly impressed, sinuous, short (extending backwards to level with middle of eyes), divergent, anterior part of course very lightly impressed; clypeus with intermediate angles obtuse, hardly advanced, median sinus small, not deep, finely bidentate; labrum small; supra-antennal plates large (hardly less prominent than eyes), not longitudinally sulcate; eyes deeply embedded in head, not prominent; posterior part of orbits large, as prominent as eyes; two supraorbital punctures on each side; suborbital channel divided by a long, strong, sharply defined ridge; a deep narrow oblique fossula on each side of submentum. Antennæ incrassate, joints 5-11 wide, greatly compressed. Prothorax as broad as long (3.5×3.5 mm.), convex, not declivous to base in middle, truncate at apex; anterior angles not

prominent, sides parallel before posterior angles, these widely rounded; base wide, rounded; a light sinuosity on each side of basal lobe; border narrow; a short wide well-marked impression on each side of basal lobe; two marginal punctures on each side. Elytra hardly as wide as prothorax (7×3.3 mm.), convex; basal declivity abrupt, emarginate, border thick along sides, upturned (not dentate) at humeral angles; marginal channel punctate (three or four punctures near shoulder, three or four widely separated along sides, and two or three on each side of apical curve); suture deeply impressed; disc a little depressed on each side of suture. External apical tooth of intermediate tibiæ small.

Length 14, breadth 3.5 mm.

Hab.—Victoria, North-western (Mallee) District (Coll. French).

Allied to *E. violaceum*, MacL.,* from which it differs in colour, more convex elytra, &c. The head appears wider (unless measured) than the prothorax. The violet and green tints of the elytra intermingle in changing lights.

EUTOMA ABERRANS, n.sp.

Long, narrow, cylindrical, lævigata; head large, transversely impressed at base, eyes deeply set in orbits, postocular prominences large; prothorax longer than broad, parallel on sides, anterior angles porrect, two marginal punctures on each side; elytra elongate-oval, lightly rounded on sides, narrowed to apex, disc impunctate, humeral angles edentate, inflexed margin narrow behind first ventral segment; anterior tibiæ bidentate. Head black with violet reflections on sides and basal depression; prothorax black-purple, becoming green near posterior and anterior angles; elytra green, disc purple, inflexed margins purple-black; legs piceous-black; antennæ piceous.

* *E. violaceum* is from West Australia; specimens have been sent to me by Mr. A. M. Lea, taken by him at Mount Barker and Darling Ranges; its exact habitat has not been previously recorded.

Head smooth, large (3.4×3.7 mm.), convex, roundly declivous to anterior margin and above eyes, constricted behind orbits and widely impressed across base; frontal sulci deep, narrow, long, oblique, converging from posterior transverse impression to clypeus, the out-turned anterior part of their course hardly marked; clypeus with median part truncate, intermediate angles short, feebly developed; preocular sulcus lightly impressed; preocular process projecting as far as eye, rounded; eyes deeply enclosed in orbits; postocular prominence large, as long and as prominent as eye; two supraorbital punctures on each side. Mandibles thick (as in *Conopterum* ♀). Antennæ short, lightly incrassate; joints 2 and 3 short, of equal length, 5-11 greatly compressed, narrow and setigerous on edge, apical joint about one-third longer than penultimate, obtuse at apex. Prothorax hardly wider than head, longer than broad (4.25×3.8 mm.), narrowed to base, convex, declivous to base; basal area depressed; sides parallel in front of posterior angles, widely rounded at posterior angles, sinuate on each side of base; anterior margin truncate, with angles strongly and obtusely advanced; base widely sublobate, truncate; border narrow, prominent, lightly reflexed, of equal width along sides, dilatate at anterior angles, thick on base; marginal channel deeply impressed along sides; median line finely marked; a lightly marked longitudinal depression on each side near basal sinuosities. Elytra narrow, hardly wider than prothorax (9×3.85 mm.), lævigata; sides lightly rounded; humeral angles hardly marked; border narrow, not thickened or elevated at humeral angles; four punctures in a wide depression on base of each elytron near humeral angle; a marginal row of punctures on each elytron (not closely placed nor in a lateral channel); suture deeply impressed. Legs light; anterior tibiæ lightly bidentate (lower side as in *Eutoma*); intermediate tibiæ without any strong dentiform projection at external apical angle.

Length 17.5, breadth 3.85 mm.

Hab.—Blomfield River, Cooktown District, N. Queensland.
(Coll. French.)

A very distinct species, evidently not closely allied to any of those previously described. Its general appearance is that of a *Eutoma*, but it presents characters intermediate between *Eutoma* and *Conopterum*; indeed, but for the narrow inflexed margins of the elytra I should have placed it in *Conopterum*; the inflexed margins of the elytra are similar to those of *Carenium quadrupunctatum*, Maccl., and the margins do not form a thick lateral bead as in *Eutoma*. A well marked foveiform impression is noticeable on the upturned margin of the apical ventral segment at each side of the apex, just above the posterior lateral setigerous punctures of the segment; these foveæ are also found in the species of the genera *Conopterum* and *Carenillum*, but I have not seen them in any species of the genus *Carenium*.

TRICHOCARENUM CYLINDRICUM, n.sp.

Elongate, cylindrical, lævigata; head large, suborbital channels very wide and not divided by a ridge in middle; prothorax of equal length and breadth, anterior angles lightly advanced; elytra oval, the border slightly upturned at shoulders, a submarginal row of six or seven distant punctures on each elytron, inflexed margin narrow behind first ventral segment; anterior tibiæ bidentate, intermediate tibiæ with a very weak external spur at apex. Black, shining.

Head large, convex (4×5 mm.); frontal sulci deep, diverging backwards from clypeus in a sinuous course, their anterior outturned part hardly marked; clypeus with median part roundly and deeply declivous, subtruncate (obsoletely trisinuate), intermediate angles wide, obtuse; preocular sulcus very lightly marked; eyes depressed, deeply set in orbits; postocular prominence two-thirds the size of and projecting slightly beyond eye; two supraorbital punctures on each side. Palpi with apical joints securiform, of maxillary moderately so, of labial very widely so and longer than penultimate joint. Antennæ stout, subfiliform; joints 5-11 depressed, apical joint very little longer than penultimate. Prothorax very little broader than head (5.2×5.2 mm.), convex; sides parallel, roundly narrowed to base; anterior angles

widely and very lightly advanced; border narrow, not sinuate on each side near base; median line very lightly impressed; three marginal punctures on each side, the anterior near anterior angle. Elytra oval (12×5.5 mm.), convex; base deeply (not abruptly) declivous; shoulders rounded; lateral border lightly folded back (not prominent or upturned) at humeral angles; a row of ocellate punctures in lateral channel; six or seven punctures in a double row on basal declivity. Prosternum sparsely setigerous-punctate on each side before coxæ. Ventral segments with punctures of ambulatorial setæ present, suture between second and third segments obsolete in middle. Legs long, light; anterior femora dilatate, four punctures on posterior edge of lower side; anterior tibiæ bidentate, inferior ridge feebly developed; posterior coxæ with three fine punctures on each.

Length 22, breadth 5.5 mm.

Hab.—West Australia (Coll. French).

This species has no near affinity to any Carenid known to me, but evidently is congeneric with *Trichocarenum elderi*, Blkb. Judging from the description of *T. elderi*, *T. cylindricum* differs from it in the supraorbital punctures, the punctures of the lower side of the anterior femora, in having one (not two) rows of punctures besides those of the marginal channel on each elytron, and in the absence of the closely placed punctures of the lateral channel of the prothorax.

NEOCARENUM SPENCERI, n.sp.

Lævigata, robust, elongate, dorsal surface rather depressed; head large, obliquely and decidedly narrowed behind eyes; prothorax as long as wide, base wide (5 mm.); elytra impunctate, deeply retuse at base, humeral angles very prominent, inflexed margin narrow behind first ventral segment; anterior tibiæ bidentate, intermediate tibiæ with a long prominent external spur at apex. Black, shining; prothorax and elytra with narrow cyaneous margin.

Head large (5×6.5 mm.); occipital region depressed below plane of vertex; frontal sulci deep, posterior part of their course

diverging continuously backwards, anterior part linear; space between frontal sulci convex; clypeus strongly declivous, median part trisinate (sinuosities deep, equal, rounded), intermediate angles prominent, triangular; preocular sulcus well marked, oblique; preocular process small, rounded and not the least angulate externally; eyes deeply set in orbits. Palpi with apical joints securiform; maxillary moderately so, labial very widely so and longer than penultimate. Antennæ subfiliform, rather stout; joints 5-11 compressed, sparsely setigerous and punctate on edges, apical joint much longer than penultimate, narrowed to apex. Prothorax of same width as head, as long as broad (6.5×6.5 mm.), widest about anterior third, lightly narrowed to base; anterior margin truncate; anterior angles obtuse, not advanced; base rounded; basal angles widely rounded; border thick, strongly reflexed and crenulate at basal angles; marginal channel wide, not interrupted at basal angles, extending along base; one marginal puncture on each side about posterior third. Elytra hardly wider than prothorax (14×6.8 mm.), parallel, widely rounded at apex, deeply and widely retuse at base; shoulders very prominent; dorsal surface depressed; suture deeply impressed, especially towards apex; sides and apex strongly and roundly declivous; base deeply and strongly declivous; border wide, widest on each side of apex, widely and strongly upturned (not dentiform) at humeral angles; a row of ocellate punctures along sides in lateral channel; four or five punctures in a single row on basal declivity. Ventral segments impunctate; suture between second and third entire. Legs not long; anterior femora rather long, thick, lightly compressed, not dilatate; channelled on lower side; anterior tibiæ light, bidentate (the teeth long), inferior ridge weakly developed, apical plate small with short triangular projection at apex.

Length 27, breadth 6.8.

Hab.—Central Australia, MacDonnell Ranges (Coll. French).

This is an isolated species among the described *Carenides*, its prothorax and elytra having a general resemblance to those of *Neocarenum blackburni*, Sl., while the head is that of a *Eutoma*.

The following tabulation of the species of *Neocarenum* may be useful:—

- I. Elytra with a submarginal row of punctures.
 - A. Posterior extremities of frontal sulci inturned* *N. elongatum*, MacI.
 - B. Posterior extremities of frontal sulci diverging continuously to posterior extremities *N. angustatum*, Sl.
- II. Elytra impunctate.
 - C. Intermediate tibiæ unidentate externally.
 - D. Head small, depressed; prothorax transverse; elytra truncate at base *N. parviceps*, † Sl.
 - E. Head large, convex; prothorax of equal length and breadth; elytra deeply retuse at base..... *N. spenceri*, Sl.
 - CC. Intermediate tibiæ bidentate { *N. retusum*, Bates.
N. blackburni, Sl.

CARENIDIUM LEAI, n.sp.

Elongate, depressed, lævigata; labrum deeply emarginate; prothorax with base widely sublobate, two marginal punctures on each side; elytra narrow, impunctate, bimucronate at apex, border not dentate at humeral angles; anterior tibiæ bidentate. Black; prothorax widely margined with green; elytra greenish-black on disc, green on sides and inflexed margin.

Head large, transverse (4.5×6 mm.), smooth; frontal sulci long, deep, diverging strongly backwards; clypeus with median part lunulate, declivous, intermediate angles strong, dentiform; preocular sulcus well marked; preocular process small; eyes deeply enclosed in orbits posteriorly, convex, not prominent; postocular process large, as prominent as eye, obliquely and gently narrowed behind; two supraorbital punctures on each side. Prothorax broader than long (5.4×6.5 mm.), widest a little in front of posterior angles, depressed on disc, not declivous to base in middle; sides subparallel, narrowed gently from anterior marginal punctures to anterior angles, widely rounded at posterior

* *N. cylindripenne*, Bates, omitted from above list, is evidently associated with *N. elongatum*, MacI.

† *N. rugosulum*, MacI., has the prothorax the same shape as *N. parviceps*.

angles, strongly sinuate on each side of base; anterior margin truncate; anterior angles lightly advanced, obtuse; base truncate; border narrow, thick, reflexed, stronger and continuous between posterior marginal punctures; median line strongly impressed; basal area defined on each side by a narrow transverse impression, convex, attaining plane of disc in middle. Elytra hardly as wide as prothorax (13×6.4 mm.), widest before the middle, depressed on disc, strongly declivous from edges of discoidal depression; sides lightly rounded; base emarginate-truncate; each elytron terminating at apex in a strong obtuse mucro and having a sub-tuberculate elevation a little before apex in front of apical mucro; a row of separate punctures along margins; four punctures (in a double row) on base of each elytron; inflexed margin rather wide, narrowing from base to apex. A deep transverse concavity on basal declivity of prosternum. Legs light (as usual in genus).

Length 26, breadth 6.5 mm.

Hub.—West Australia, Champion Bay District (Lea; Coll. Lea).

Allied to *C. mucronatum*, Macl., but differing by its narrower form, longer apical mucros, ante-apical tubercles, the flat discoidal area of the elytra, &c. The edges of the discoidal depression are sharply defined, and almost form a ridge beginning behind each shoulder and ending in the subtuberculate elevations near the apex.

CONOPTERUM RIVERINÆ.

Carenum riverinæ, Macl., Trans. Ent. Soc. N.S.W. 1865, i. p. 181; *Carenum amabile*, Casteln., Trans. Roy. Soc. Victoria, 1867, viii. p. 135; *Conopterum insigne*, Chaud., (?) Ann. Soc. Ent. Belg., 1869, p. 148; *C. violaceum*, Macl., P.L.S.N.S.W., 1887, ii. (2), p. 127; *C. barnardi*, Macl., l.c. p. 129.

I have already published the synonymy of *Carenum amabile* with *Conopterum riverinæ*, and am now convinced, after comparison of specimens in my possession with those in the Macleay Museum, that *C. violaceum* and *C. barnardi* are also merely synonyms of this species. After comparing my specimens with the description of *C. insigne* (the size of which is not stated) I feel no doubt but that it is also conspecific with *C. riverinæ*.

Hab.—Queensland, Dawson River (Barnard); N.S. Wales, Mudgee (Macleay), Lachlan River (Castelnau), Narrandera District (Sloane).

Genus TERATIDIUM.

In his description of the genus *Teratidium*, Mr. Bates remarked: "The extraordinary insect for which this new genus is necessary, agrees with *Monocentrum* only in the absence of the usual tooth or teeth of the anterior tibiæ above the apical one; but the excessive dilatation of the terminal joint of the maxillary (as well as the labial) palpi and the very short faint frontal grooves, form very distinct and peculiar characters." After reading this, one wonders whether Mr. Bates was acquainted with *Monocentrum* in nature; a specimen of *M. longiceps*, Chaud., is in my possession, and it has the maxillary palps very securiform, their terminal joint being quite as securiform as, though a little smaller than, the labial.

The following diagnosis of the genus gives some features not noticed in the original description:—

Head constricted posteriorly, the constriction very strong behind the mentum, suborbital channels and orbits; part of head before posterior constriction transversely subquadrate; vertex without longitudinal sulci, convex, declivous to eyes; a wide sulciform impression extending backwards along upper margin of eyes to neck, and dividing vertex from eyes and orbits; supra-antennal plates large, prominent, declivous, not longitudinally sulcate; clypeus strongly declivous, not divided in middle from front, defined on each side by a light linear sulcus (*frontal sulci*); eyes deeply set in orbits, these large and more prominent than the eyes; suborbital channels wide, short, single. Maxillary and labial palpi with two apical joints similar in shape; penultimate joint shorter than terminal. Elytra impunctate; lateral margin upturned, reflexed and widely rounded at humeral angles; punctures of base placed not on basal declivity, but in a depression just behind the declivity; inflexed margin narrow behind first ventral segment.

TERATIDIUM PERLONGUM, n.sp.

Narrow, elongate, cylindrical, lævigata; head widely transverse, constricted posteriorly, orbits very prominent; prothorax longer than broad, convex, anterior angles lightly advanced; elytra elliptical, cylindrical, impunctate. Black; prothorax with faint purple reflections near sides (most noticeable near posterior angles), elytra dark purple with a greenish iridescence in changing light.

Head large (4.2×5.3 mm.), convex; anterior part widely subquadrate; front with a light oblique linear impression on each side defining the sides of the clypeus; a punctiform impression near posterior extremity of these sulci: clypeus convex, strongly declivous to anterior margin, a lightly impressed puncture on each side behind intermediate angles; median part narrow, emarginate-truncate (obsoletely trisinate); intermediate angles wide, obtuse, short, projecting; supra-antennal plates prominent, large, convex, rounded externally, not longitudinally impressed; eyes deeply set in orbits, depressed; orbits very large, projecting beyond and enclosing posterior two-thirds of eyes, obliquely and roundly constricted to neck. Prothorax a little longer than broad (6×5.2 mm.), hardly as wide as head (narrower at anterior angles), convex, roundly declivous to base; sides lightly rounded, lightly narrowed to base; anterior margin truncate; anterior angles very feebly advanced; posterior angles not marked; basal curve lightly sinuate on each side near base; basal angles rounded, not marked; base lightly rounded, not bordered except obsoletely on each side border; median line very lightly impressed; a wide lightly depressed space between sinuosities of basal curve. Elytra a little wider than prothorax (13.6×5.5 mm.), widest about middle, very convex; suture deeply impressed; sides lightly rounded, more narrowed to shoulders than apex; apical curve short; base lightly emarginate behind middle of peduncle; shoulders rounded, declivous; basal declivity abrupt, impunctate; lateral border narrow near shoulder, becoming very wide and thick posteriorly, upturned and rounded at humeral angle, reaching peduncle, not reaching apex; a row of umbilicate

punctures along margin, these more widely placed towards apex; a wide oblique punctate impression on each elytron near base (facing humeral angle); space between this impression and base strongly convex. Ventral segments impunctate. Anterior trochanters narrow; femora strongly dilatate above trochanters, compressed, not channelled on lower side; tibiæ wide at apex, external apical projection stout, curved; intermediate tibiæ lightly incrassate, external angle pointed, not dentate.

Length 25, breadth 5·5 mm.

Hab.—West Australia, Kalgoorlie Diggings (G. F. Froggatt; Coll. Froggatt).

Differs from the description of *T. macros*, Bates, by its smaller size, colour, the clypeus not having four teeth of equal size, &c.

TERATIDIUM LATICEPS, n.sp.

Narrow, elongate, rather depressed, lævigata; head large, subquadrate, constricted posteriorly; elytra impunctate, oboval, lateral borders thick (forming a bead along sides); anterior tibiæ unidentate. Head black with faint purple reflections on occiput and below orbits; prothorax shining purple on disc widely margined with green, under parts tinged with purple and green; elytra purple; legs, antennæ and abdomen black (ventral segments with faint greenish reflections).

Head large (3·25 × 4·5 mm.), convex; anterior part widely subquadrate; front with a light (almost obsolete) oblique linear impression on each side defining sides of clypeus and terminating posteriorly in a punctiform impression; vertex wide, smooth, convex: clypeus convex, roundly and deeply declivous to anterior margin, a light punctiform impression on each side behind intermediate angles; median part small, emarginate-truncate; intermediate angles very obtuse and hardly prominent; supra-antennal plates large, convex, smooth, not transversely sulcate; eyes deeply set in orbits, depressed; orbits large, projecting beyond and enclosing the posterior two-thirds of eyes, one supraorbital

puncture on each side.* Mandibles stout, short. Labrum small. Palpi with apical joint very widely securiform. Antennæ stout; joints 5-11 compressed, bisulcate and setose on edges, apical joint much longer than penultimate, obtuse at apex. Prothorax narrower than head, longer than broad (4.75×4.25 mm.), lightly convex (disc a little depressed), not declivous to base in middle; sides subparallel before posterior angles; lightly and shortly rounded to anterior angles, lightly narrowed to base; anterior angles not prominent; posterior angles not marked; basal angles obtuse; base lightly rounded; border narrow, thicker and more strongly reflexed at basal angles, lightly and widely sinuate on each side near base, obsolete in middle of base; marginal channel narrow, obsolete on base; median line strongly impressed on disc; one marginal puncture on each side about anterior fifth; basal area lightly defined on each side, not depressed below plane of disc in middle. Elytra hardly as wide as prothorax (10×4.5 mm.), widest rather behind middle, narrowed to base, depressed on disc, strongly and roundly declivous to sides and apex; base triangularly emarginate behind peduncle; shoulders rounded; apical curve wide; the apex itself produced shortly and obtusely beyond lateral border; this border narrow near shoulders, becoming very wide and thick posteriorly, widely upturned but not dentate at shoulders; a row of umbilicate punctures along sides, becoming more widely placed towards apex; an oblique foveiform punctate depression at each shoulder just behind base; basal declivity abrupt, impunctate. Ventral segments impunctate. Legs light: anterior tibiæ with apex strongly produced externally, a small denticulation on external edge level with base of tarsus; inferior

* The specimen before me has one supraorbital puncture placed above the posterior margin of the eye on the right side and two on the left, but I believe one to be the normal number, for there is throughout the whole tribe of the *Carenides* a tendency for single punctures on the head, prothorax and elytra to be sometimes represented by two similar punctures placed close together.

ridge obsolete; inner apical spine long, strong; intermediate tibiae with a minute external tooth at apex.

Length 20, breadth 4.5 mm.

Hab.—Central Australia (Coll. French)

This species differs greatly from *T. macros*, Bates, (from description) by its smaller size, colour, the clypeus not having four teeth of equal size, &c.; from *T. perlongum*, Sl., it differs by its smaller size, colour, facies,—the head more quadrate, the elytra depressed, &c. I have not found any trace of a marginal puncture at the posterior angles of the prothorax as usual among the *Carenides*.

During the time that has elapsed since the publication of my "Second Note on the *Carenides*," the following species have been added to the tribe:—

Euryscaphus terrenus, Sl., *Carenum frenchi*, Sl., *C. optimum*, Sl., *C. cognatum*, Sl., *C. gracile*, Sl., *Eutoma viridicolor*, Sl., *Neocarenum blackburni*, Sl.

CONTRIBUTIONS TO A KNOWLEDGE OF THE FLORA OF AUSTRALIA.

No. I.

By R. T. BAKER, F.L.S., ASSISTANT CURATOR, TECHNOLOGICAL
MUSEUM, SYDNEY.

(Plate x.)

PITTOSPOREÆ.

*CHEIRANTHERA FILIFOLIA, *Turcz.*—Wallangara, N.S.W. In the open and on the slopes of granitic ridges (Mr. D. A. Porter).

The specimen forwarded by Mr. Porter is a smaller plant than any I have yet seen of *C. linearis*, A. Cunn., and agrees fairly well with Bentham's description of *C. filifolia*, except perhaps in the relative length of the anthers and filaments,—points, I find, that are not constant; and so with the balance of evidence in favour of this species I now record it for Eastern Australia, believing that further material will confirm my present determinations. If this should prove not to be *C. filifolia*, A. Cunn., then I think the latter name will have to be considered as a synonym of *C. linearis*, Bentham himself stating (*B.Fl.* i. p. 127) that the two are closely allied.

STERCULIACÆ.

SERINGIA PLATYPHYLLA, *J. Gay.*—Murwillumbah, Tweed River (W. Bäuerlen).

TILIACÆ.

ELÆOCARPUS BÆUERLENI, *J.H.M. et R.T.B.*—Richmond River, Emigrant Creek at Tintenbar and Byaneum, 5 miles from Mullumbimby, Tweed River (W. Bäuerlen).

* Species marked with an asterisk have not previously been recorded from New South Wales.

RUTACEÆ.

BORONIA MICROPHYLLA, *Sieb.*—Braemar, Southern Line. In flower in October (Miss J. Lane). This is its most southern recorded locality and extends its range from Parramatta.

The specimens examined confirm, I think, Bentham's decision (*B.Fl.* i. 318) in preserving the specific rank of this *Boronia*, as opposed to the opinion of Baron von Mueller, who unites it with *B. pinnata*, Sm. I show specimens of both species collected from the above localities, and the constant form of leaf of each species throughout the varying environments is very marked.

CROWEA EXALATA, *F.v.M.*—On the banks of Still Creek, Woniora River; only represented by a few bushes (Mr. H. Clarke).

The late Dr. Woolls says of this plant—"It is rather curious that only one shrub of this species has ever been found on low ground, and that was near Parramatta some years ago. Within the last few months a few more shrubs have been discovered at Kurrajong." (*Proc Linn. Soc. N. S. Wales*, 1886 (2), i. p. 929).

ERIOSTEMON SALICIFOLIUS, *Sm.*—Evans River (W. Bäuerlen). There is no previous record of this local species to the north of Port Jackson.

ASTEROLASIA CORREIFOLIA, *Benth.*—Murwillumbah, Tweed River (W. Bäuerlen). Previously not recorded further north than Gosford.

RHAMNEÆ.

POMADERIS PRUNIFOLIA, *A. Cunn.*—As far west as Raglan, Bathurst (W. J. C. Ross, B.Sc.). The specific differences between this species and *P. betulina*, A. Cunn., are not very marked, but perhaps *P. prunifolia* is best distinguished by the scabrous and wrinkled surface of its leaves.

LEGUMINOSÆ.

OXYLOBIUM PROCUMBENS, *F.v.M.*—Strathdownie, Rosewood, *via* Wagga Wagga (Mr. D. McEacheron). This extends its range further north than hitherto recorded.

ACACIA MAIDENI, *F.v.M.*—A quantity of fresh fruiting material of this species has recently been examined by me, and from my observations it would appear that an error has occurred in the delineation (mei) and description (*F.v.M.*) of the arillus, in the Macleay Memorial Volume. Our collector now admits having inadvertently wrongly matched the pods. Those figured are from *A. melanoxydon*, R Br. The true seed has a much shorter arillus under it and not encircling the seed at all. It has only two or three short folds. A strict examination, however, revealed nothing to shake its specific rank. The fruits and seeds are quite distinct from those of *A. glaucescens*, its ally.

SAXIFRAGÆÆ.

*ARGOPHYLLUM NITIDUM, *Labill.*—(Plate x). Mt. Nullum and Tumbulgum, Tweed River (W. Bäuerlen).

For the identification of this species I am indebted to J. G. Luehmann, F.L.S. The only locality given in the *Index Kewensis* (Vol. i. p. 183) is New Caledonia, so that it is therefore new for Australia. In the above reference Forster is quoted as the author, and it is very probable that it was on this species that the genus was founded (*Forst. Char. Gen.* 30). Bentham, however, (*B. Fl.* ii 437) ascribed the authorship to Labillardière, but I should like to venture an opinion that *A. ellipticum* is what is intended (vide *Index Kewensis*, Vol. i. p. 183).

There is apparently no description of this species extant. It is a very pretty shrub of about 20 to 30 feet high. The branches and inflorescence are clothed with a close silky white tomentum more silvery than in *A. Lejournanii*, *F.v.M.* Leaves ovate, acuminate, varying from 4 to 7, 8 or even 9 inches long and up to 2 inches broad, on a petiole of $\frac{1}{2}$ inch long or more, entire or serrate, light green and glabrous above, silvery-white underneath with a close silky tomentum, the pinnate parallel veins and midrib not prominent on the upper surface.

* Species marked with an asterisk have not previously been recorded from New South Wales.

Inflorescence a loose corymbose terminal panicle, much exceeding the leaves, or in the upper axils much shorter than the leaves. Flowers when fully expanded exceeding 3 lines in diameter. Calyx turbinate or hemispherical, adnate to the ovary, lobes 5, persistent, acute. Petals 5, valvate, persistent, fringed inside below the middle with long hairs forming a corona. Capsule glabrous, about 2 lines in diameter, hemispherical, mostly 3-valved; seeds very small, reticulate.

Comparing the above with the delineations in Forst. Char. Gen. p. 30, and which I reproduce (Pl. x. figs. 1-10; upper division of the plate) it will be found there are many points of difference, as for instance the nectary (which I cannot understand in Forster's figure), the calyx lobes and capsule.

I have endeavoured to obtain New Caledonian specimens for comparison, but have not been successful. If this should be distinct from the New Caledonian plant, I would suggest the name of *A. Nullumensis*, from the locality where first obtained.

CERATOPETALUM GUMMIFERUM, *Smith.*—Mr. W. Bäuerlen, reporting on this species, says—"At Moonambah, Tweed River, I have seen trees lately fully 60 feet high and 18 inches in diameter, but they were so situated that it would be exceedingly difficult to obtain a log from the locality." These are dimensions that surpass any previous records.

CERATOPETALUM APETALUM, *D. Don.*—McPherson Ranges, six miles from the Queensland boundary (W. Bäuerlen). This is a considerable extension of range, as it was previously only known for a few miles north of Port Jackson.

COMPOSITEÆ.

CASSINIA ARCUATA, *R.Br.*—As far east as Upper Pyramul (Mrs. A. Tindall). Previously recorded from the Darling River.

CASSINIA SUBTROPICA, *F.v.M.*—Moonambah and Billundgel, Tweed River (W. Bäuerlen). Lindsay is the only locality given in *B.Fl.* (iii. p. 588).

GOODENOVIÆ.

SCÆVOLA ÆMULA, *R.Br.*—Bundanoon, near Moss Vale (Mr. B. Dunstan). A dry country species.

EBENACEÆ.

CARGILLIA MABACEA, *F.v.M.*—Mullumbimby, Brunswick River. A species of doubtful affinities, as it was described without female flowers and fruits. The latter have now been collected by Mr. Bäuerlen in the above locality, which is probably its most southern locality. They may be described as depressed globular and oval in shape, $\frac{1}{2}$ to over 1 inch long and 1 inch in diameter; calyx persistent; colour bright red: containing 2-7 seeds. The average height of the tree is from 25-60 feet; timber white, but of little use, being very susceptible to the attacks of *Xyleborus* spp.; bark black, laminated.

APOCYNÆÆ.

*OCHROSIA POWERI, *Bail.*—Murwillumbah, Tweed River (W. Bäuerlen). Originally described by F. M. Bailey in his Botany Bulletin, xiii. p. 11, from fruits and foliage only. Full material has been collected by Mr. Bäuerlen. The flowers I will not describe here, as I have sent some to Mr. Bailey and have asked him to publish a description in his Bulletins, so that a complete account of the whole plant may be found in the same serial. The plant in this colony grows to a shrub of about 10 feet high.

TABERNÆMONTANA ORIENTALIS, *R.Br.*—As far south as the Hastings River (R. Harper).

*SOLANUM CILIATUM, *Lam.* (*S. aculeatissimum*, *Jacq.*).—Lismore (W. Bäuerlen). This is the first record of the occurrence of this exotic in New South Wales, though it has been known to me from the neighbourhood of Sydney for some years, but confounded with *S. sodomæum*. I am indebted to Mr. J. G. Luehmann, F.L.S., for the correct diagnosis.

* Species marked with an asterisk have not previously been recorded from New South Wales.

LAURINEÆ.

TETRANTHERA (LITSÆA) RETICULATA, Meissn.—There has long been a doubt as to the exact botanical determination of the marketable timber passing under the name of "She Beech." Many authors have referred it to *Cryptocarya glaucescens*, R.Br., and specimens of timber exhibited in International Exhibitions and now in the Technological Museum were labelled with the latter name queried; but I think now the matter can be definitely settled, as I have acquired botanical (timber and flowering) specimens from Gosford, Port Macquarie and Lismore, and without doubt "She Beech" is *Tetranthera reticulata*, Meissn.

The timber of *Cryptocarya glaucescens* is quite distinct, being much lighter in colour, more durable and with little or no figure, as against the rich brown colour and large figure of *T. reticulata*.

"She Beech" timber is, I find, also being sold in the Sydney market under the name of "Bully or Bolly Gum," so that we have the timber merchants selling to an unsuspecting public apparently two distinct timbers, but which are in reality from one and the same species, *i.e.*, *T. reticulata*.

CASSYTHA PANICULATA, R.Br.—Bundanoon (T. Steel, F.L.S.). Not previously recorded south of Port Jackson.

PROTEACEÆ.

***GREVILLEA ILICIFOLIA R.Br.**—Kyamba (Forester Taylor). Locally known as "Wild Holly."

URTICÆÆ.

FIGUS MUELLERI, Miq.—As far north as Lismore (W. Bäuerlen).

***LAPORTEA MOROIDES, Weddell.**—Murwillumbah, Tweed River (W. Bäuerlen). A nettle with "most virulent stinging hairs," previously only known from Queensland.

* Species marked with an asterisk have not previously been recorded from New South Wales.

PANDANEE.

*FREYCINETIA EXCELSA, *F.v.M.* — North Tumbulgum, Tweed river (W. Bäuerlen). "In gullies and trailing along the ground, chiefly, however, ascending the trunks of trees to a height of 100-120 feet, mostly in straight stems, though also sometimes in a spiral or at least crooked course; these stems are often very numerous; for instance, to-day I have seen a tree along the trunk of which there must have been fully 80 stems, forming an interlacing network for some distance up the tree. This is, as far as I have seen, an exceptional tree, but trees along which from 30-40 stems are running are not exceptional. These stems are usually from $\frac{1}{2}$ inch to $\frac{3}{4}$ inch in diameter, and soon commence to branch, the branches being usually very slender and from 1 inch to 5 feet in length, mostly gracefully drooping. The young stems have quite a different appearance, having the leaves much shorter and broader, also much further apart."

As it has only been recorded from imperfect material, I now add the following systematic notes:—Female spikes terminal, solitary, ovoid oblong, 1 to $1\frac{1}{2}$ inch long on peduncles of about 1 inch long; of a bright crimson colour. Ovaries very numerous, compact, cohering at their bases, free in the upper half, divided mostly into two stigmas, occasionally three, as in *F. Gaudichaudii*, R.Br. and Benn. Fruit bursting irregularly, as also in that species. Seeds numerous, oblong, flat, about $\frac{1}{2}$ line long, testa light yellow, with white oblong cellular longitudinal appendages or strophioles as long as the seeds.

This plant exudes on its leaves a red resinous substance, the colouring being contained in the resinous portion; it is removed by alcohol, the residue consisting of gum. The exudation is thus a gum-resin. It was not in sufficient quantity to accurately determine its constituents more fully.

* Species marked with an asterisk have not previously been recorded from New South Wales.

GRAMINEÆ.

ANDROPOGON REFRACTUS, *R.Br.*—Moree, on the Gwydir River (Surveyor Archibald Lockhart). Mostly a coast grass.

ASTREBLA PECTINATA, *F.v.M.*—As far east as Calga, Gilgandra, 292 miles west of Sydney (Messrs. Ryder Bros). The material sent was very complete and showed such a variety of forms as to prove conclusively to me that there is little reason for retaining *A. triticoides* as a distinct species.

FILICES.

*PTERIS ENSIFORMIS, *Burm.*—Bundanoon (Mr. B. Dunstan). A Queensland species.

POLYPODIUM ASPIDIODES, *Bail.*—Bundanoon (Mr. B. Dunstan). This species was first recorded from this Colony by J. H. Maiden and R. T. Baker (Proc. Linn. Soc. 1895, Vol. x. (2), p. 517) as occurring at Tintenbar.

FUNGI.

I have to acknowledge my indebtedness to Mr. M. C. Cooke, M.A., LL.D., A L.S., for the identification of the majority of the following fungi.

*AGARICUS (PSATHYRELLA) TREPIDUS, *Fr.*—Technical College grounds, Sydney; recorded previously only from Victoria.

*CORTINARIUS ARCHERI, *Berk.*—Moonambah, Tweed River, in sandy soil (W. Bäuerlen). "It is of a rich violet colour when fresh" (W.B.). Previously recorded only from Tasmania (Cooke's *Aust. Fungi*, p. 72).

*LENTINUS SUBDULCIS, *Berk.*—Alstonville, N.S.W. (W. Bäuerlen). A sweet-scented fungus found on the stumps of the Bangalow Palm.

*PANUS TORULOSUS, *Fries.*—Ballina (W. Bäuerlen).

* Species marked with an asterisk have not previously been recorded from New South Wales.

*LENZITES GUILFOYLEI, *Berk.*—Mogo, Bateman's Bay (W. Bäuerlen).

*POLYPORUS TUMULOSUS, *Cooke.*—Lismore, (W.B.)

*POLYSTICTUS RASIPES, *Berk.*—Moonambah (W. Bäuerlen).
On trunks of trees.

*P. VINOSUS, *Berk.*—Moonambah, Tweed River (W. Bäuerlen).

*P. CICHORACEUS, *Berk.*—Sugar Loaf Mountain, Monga [Braidwood]. (W. Bäuerlen).

*POLYSTICTUS RIGESCENS, *Cooke.*—Ballina. Not previously recorded from Australia.

*P. ELONGATUS, *Berk.*—Tintenbar (W. Bäuerlen). A beautiful delicate silky fungus, with a violet-coloured edge.

*POLYSTICTUS HASKARLII, *Lev.*—Tweed Heads; on the stem of a living tree (W. Bäuerlen).—A tawny scoop-shaped fungus.

*HEXAGONIA WIGHTII, *Klotsch.*—Lismore (W. Bäuerlen).

*H. TENUIS, *Hook.*, var. *SUBTENUIS*, *Berk.*—Moonambah, Tweed River; and Ballina (W. Bäuerlen).

*H. DECIPIENS, *Berk.*—Botany, near Sydney.

*HYDNUM MERULOIDES, *Berk.*—Ballina (W. Bäuerlen).

*STEREUM CAPERATUM, *Berk. & M.*—Ballina (W. Bäuerlen).
Also in Lord Howe Island.

S. CAPERATUM, *Berk. & M.*, var. *SPONGIPES*, *Berk.*—(W. Bäuerlen).

*HYMENOCHETE TENUISSIMA, *Berk.*—Ballina (W. Bäuerlen).
A thin ferruginous fungus not previously known to occur in Australia.

*AURICULARIA ALBICANS, *Berk.*—Tintenbar; on old logs (W. Bäuerlen).

*COLUS HIRUDINOSUS, *C. & S.*—Glanmire, Western Line (A. G. Ivatt). Cooke records it from West Australia.

* Species marked with an asterisk have not previously been recorded from New South Wales.

**CALOSTOMA FUSCA*, *Berk.*—Dorrigo (J. H. Maiden), and at Hornsby, N.S.W. (W. W. Froggatt).

**XYLARIA ALLANTOIDEA*, *Berk.*—Ballina (W. Bäuerlen). A remarkable fungus.

**DICHOMERA SERICEA*—Tintenbar (W. Bäuerlen). Not previously recorded from Australia.

EXPLANATION OF PLATE.

Argophyllum sp. *Forst. Char. Gen. t. 30.*

- Fig. 1.—Flower (enlarged).
Fig. 2.— „ „ „
Fig. 3.—Petal.
Fig. 4.—Calyx with nectary
Fig. 5.—Part of petal showing fringe (enlarged).
Fig. 6.—Corolla (dissected).
Fig. 7.—Stamen (enlarged).
Fig. 8.—Capsule „
Fig. 9.—Pistil.
Fig. 10.—Capsule (enlarged and dissected).

Argophyllum nitidum.

- Fig. 1.—Panicle of inflorescence.
Fig. 2.—Leaf with lateral panicle.
Fig. 3.—Bud (enlarged).
Fig. 4.—Expanded flower (enlarged).
Fig. 5.—Seed vessel.
Fig. 6.—Top view of 5.
Fig. 7.—Seed (nat. size).
Fig. 8.—Seed (enlarged).

* Species marked with an asterisk have not previously been recorded from New South Wales.

THE GENUS *HETERONYMPHA* IN NEW SOUTH WALES.

BY G. A. WATERHOUSE.

The Genus *Heteronympha* is typically Australian, being found chiefly along the eastern coast. All the known species have been taken in New South Wales with the exception of the Western Australian form of the commonest species of the genus. *Heteronympha* belongs to that portion of the Australian fauna which characterises the subregion to which Prof. Baldwin Spencer has applied the term "Bassian."* These butterflies all frequent dull damp spots, and are fond of settling on the ground among the dead leaves, so as to make it very difficult to distinguish them, as on the under side their wings resemble a withered leaf, so much so that I have often stood a few feet away from the spot where I had seen one of these butterflies settle without detecting it. They are most plentiful and most easily caught on drizzling rainy days. In this genus the males always appear on the wing before the females. As far as I am aware the life-histories of only two have been worked out; these will be found in *Victorian Butterflies, Part I*. The larvæ are probably all grass-feeders, sluggish in the day time, feeding only at night. This will account for the extreme difficulty in finding larvæ or pupæ. I will now deal with the different species more in detail.

HETERONYMPHA MEROPE, *Fabr.*—This butterfly is at certain times one of the commonest near Sydney, and is chiefly found in gullies. The males appear on the wing in November, very few females being seen then, while later on in January the females predominate, only damaged males being on the wing. The sexes of this insect differ considerably from each other, the female being

* Report of the Horn Expedition, Part i. 1896, p. 197.

much the larger. The life-history of this insect has been worked out in Victoria.* It has a very wide range, extending from Brisbane along the eastern and southern coast to Perth, W.A., and is also found in Tasmania. *H. Duboulayi*, Butler, recorded from Western Australia, is only a local form of this insect. The best localities near Sydney are the gullies near Rose Bay and on the North Shore; it is also common in the National Park; generally speaking it is prevalent in the county of Cumberland wherever the native bush has not been destroyed.

H. MEROPE, *Fabr.*, var. *SUFFUSA*, *Skuse*.†—A very remarkable suffused variety of the female of this species was caught by myself near Bowral in January, 1894. The specimen is dark brown on the upper side, with light yellow towards the base, the bluish spot of the apical angle being visible. The under side is similar to that of the typical form, only much darker. I have heard lately that a male similarly suffused has been taken in Victoria.

H. DIGGLESI, *Miskin*.—This butterfly appears on the wing at the end of the year. It was supposed that this species was confined to Queensland, but I have several records of its occurrence near Sydney. Mr. G. Masters informs me that a number were caught at Five Dock some twenty years ago. Mr. J. E. M. Russell has taken it several times in the National Park, and at the end of last year I caught it both at the National Park and at Clifton. It has been thought that this species is the male of the following; but although I believe this to be the case, I have no absolute proof, never having found the food plant.

H. MIRIFICA, *Butler*.—This is a very local species, being found only in very shaded gullies. It has the habit of settling on the ground, and cannot be recognised among the dead leaves, which it closely resembles. In shape it is like the female of *H. merope*, but differs in being black, with a white band across the anterior wing. This butterfly is on the wing from Christmas

* Anderson and Spry, *Victorian Butterflies* (1893), pp. 60, 62.

† Trans. Ent. Soc. 1895, p. xiv.

onwards, and may be taken in the creeks of the Port Hacking River, at Clifton, and the Bulli Pass. It is also recorded from Brisbane.

H. BANKSII, *Leach*.—This insect appears on the wing in March. An early brood may appear in November, but I have not caught any then. In the present year I caught it first on the 20th February in the National Park, and later at Clifton, on 20th March, I caught several; all the specimens were males, and both days were wet, while on the days preceding 20th March (which were fine) I did not see any specimens. During Easter I caught numbers of females and only battered males. The difference between the sexes is not very great. The female has more yellow markings, and has a white spot in the apical angle of the anterior wing, which is wanting in the female. The life-history has been worked out in Victoria.* I have been informed by Mr. G. Masters that formerly this butterfly was once plentiful at Mosman's Bay, but now, owing to the progress of settlement, is rarely seen there. It may be taken plentifully at the proper time from the National Park to Wollongong. It is also recorded from Victoria and Brisbane.

H. PARADELPHA, *Lower*. I believe this to be the first record of this species from New South Wales. In appearance the butterfly is somewhat like *H. Banksii* on the upperside, while on the underside it comes between *H. philerope* and *H. cordace*. It may be distinguished from *H. Banksii* by being lighter in colour, and by having a black spot in the apical angle of the anterior wing, which is absent from *H. Banksii*. The female is without the apical white spot which marks the female of *H. Banksii*. The female of this species differs from the male on the upperside by being very much lighter in colour, while on the underside of the posterior wing it has a pinkish suffusion. This butterfly has been known for a long time in Victoria, where, however, it is by no means common, and was described only a few years ago by Mr.

* Anderson and Spry, *Victorian Butterflies* (1893), pp. 64, 65.

Lower, who thought it to be confined to that colony. Mr. G. Masters took a single specimen (♂) in September, 1863, at Merimbula, near Bega. This specimen is now in the Macleay Museum. A few months ago I had the satisfaction of seeing examples of both sexes in the collection of Mr. A. G. Hamilton, of Mount Kembla, which he had caught near his house. On the 19th March of this year Mr. N. W. Hansard caught a female near Picton, and saw several others on the wing. I should think the best time to look for this insect would be in January and February, and it should be found along the Illawarra Range.

H. CORDACE, *Hübner*, H. PHILEROPHE, *Boisd.*, have both been taken on the Liverpool Plains by the late Mr. A. S. Olliff. I have not heard of their being taken nearer Sydney, but they will probably be recorded sooner or later if search is made for them. *H. philerophe* is common near Mount Kosciusko. Both are well known Victorian species.

Appended is a note on *Xenica hobartia*, Westwood. The only specimens of the above species from New South Wales are:—One specimen caught by Mr. Olliff near Katoomba Railway Station; two specimens by Mr. Russell at the Hawkesbury, and one specimen (♀) by Mr. G. Lyell, Junr., on 5th October, 1896, at Narrabeen. This last specimen is in my collection and is exhibited to-night.

THE LIFE-HISTORY OF *APAUSTUS LASCIVIA*, ROSENSTOCK.

BY G. A. WATERHOUSE.

APAUSTUS LASCIVIA, Rosenstock, Ann. Mag. Nat. Hist. (5),
xvi. (1885), p. 378, Pl. xi. fig. 1.

In January of the present year it was my good fortune to find at Rose Bay the larvæ of a small skipper, of whose life-history I can find no record. The larvæ were found feeding on a grass, *Imperata arundinacea*. Each larva conceals itself by uniting the edges of the leaves so as to form a sheath, inside which it remains. When feeding, which is usually at night, it protrudes its head just outside this sheath and nibbles the edges of it. When one of these sheaths is eaten up, the larva makes another retreat. The larva, when full grown, is one inch in length, being pale green in colour; the two segments nearest the head are smallest. When half-grown the head is totally black, but when full grown is very light brown with the black V-shaped marking common to the larvæ of this family and a black ring round the outer edge of the head. The larva when full grown constructs a sheath similar to the one it feeds in, closes up both ends and casts its skin. The pupa is at first a pale olive-green, gradually turning a light brown. The wings change colour first. The pupa is about half an inch long. It usually remains in the pupal state from ten to twelve days. This butterfly is very common in February, when hundreds may be seen. It is found in gullies wherever its food-plant occurs, being very plentiful in Double Bay Gully.

Mr. Olliff has described and figured* the details of the life-history of another species of this genus, *A. agraulia*, Hewitson, its food-plant being couch grass.

When I bred this insect I also bred another skipper, but I hesitate to give its life-history, as I have not yet determined it specifically, the nomenclature of the *Hesperidæ* being very confused at present.

* Ann. Mag. Nat. Hist. (5), 1888, p. 360, Pl. xx. figs. 3a, 3b.

SOME NEW GENERA AND SPECIES OF FISHES.

BY J. DOUGLAS OGILBY.

HETERODONTIDÆ.

GYROPLEURODUS. ? sp. nov.

Appended is the description of the teeth of a cestraciont shark caught some years ago off Manly Beach and preserved on account of their beauty. It will be seen from the description that the dentition differs greatly from either of the Australian species, but approaches that of *Gyropleurodus galeatus* in the uninterrupted divergence of the rami of the jaws, while differing in the large number of short and strongly carinated lateral teeth. I am unwilling to describe this species as new on the evidence of this pair of jaws alone, but wish to call attention to the possibility of a third species being found in our waters, and to impress on such of my readers as may have the opportunity the necessity for examining all specimens of Bullhead Sharks for a similar pair of jaws, and, when found, to preserve the entire animal. The only species with which it could be confounded (besides *galeatus*) is *Gyropleurodus quoyi*, Freminville, a little known species from the Galapagos Islands; it is, however, possible that these jaws belong to an adult *G. galeatus*, in which the two elongate molars have been more or less symmetrically broken up into a number of small ones.

In the upper jaw the anterior teeth are stout and conical without or with scarcely a trace of a basal cusp; passing backwards along the sides the bases of the teeth become broader and the cusp more and more strongly inclined backwards, until they almost insensibly merge into the strongly carinated molariform lateral teeth, of which there are about ten whorls on one ramus

and eight on the other; these teeth are so deeply grooved on the outside as to appear almost bicarinate; each whorl contains ten teeth, while in the anterior rows there are thirteen, some of the inner ones being the largest.

The teeth of the lower jaw are similar to those of the upper, but the line of demarcation between the anterior and lateral teeth is even less marked, many of those near the dividing line bearing a short blunt median cusp which is succeeded by one or even two smaller cusps, so as to leave only five or six short inconspicuous molariform series.

The following are the measurements of the jaws:—

Length of the dentigerous portion of the upper jaw, 78 mm.;
of the lower, 74 mm.

Width at the inner angle of the dentigerous portion: upper
jaw, outside 32 mm., inside 5 mm.; lower jaw, outside
28 mm., inside 4 mm.

Width between last teeth: upper jaw, 61 mm.; lower jaw,
41 mm.

Greatest depth of dentigerous portion: upper jaw, 41 mm.;
lower jaw, 37 mm.

MYRIDÆ.

SCOLECENCHELYS, gen.nov.

Body very elongate and vermiform, terete. Head small and narrow. Mouth rather large, its cleft extending well behind the eye, the lower jaw much shorter than the upper. Teeth conical, in one or more series in the jaws and on the vomer. Nostrils pierced on the edge of the upper lip, the anterior near the tip of the snout, tubular, and directed downwards, the posterior an oblong slit. Gill-openings small and vertical. Dorsal and anal fins low or subrudimentary, the former originating near the vertical from the vent; no pectorals. Vent close in front of the anal fin. Skin scaleless; lateral line forming a continuous band along the middle of the side.

Etymology:—σκόληξ, a worm; ἔχελυς, an eel.

Type:—*Muraenichthys australis*, Macleay.

MYROPTERURA, gen.nov.

Body rather short, subterete in front, compressed behind. Head rather long and narrow. Mouth moderate, the cleft scarcely extending beyond the eye; lower jaw not much shorter than the upper. Teeth conical, in one or two series in the jaws; canines present; vomerine teeth present. Nostrils pierced in the upper lip; the anterior tubular, well behind the tip of the snout, and directed downwards, the posterior on the inner edge of the lip, elongate. Gill-openings rather wide and oblique. Vertical fins well developed, expanded posteriorly, the dorsal originating behind the vent; pectorals absent. Vent close in front of the anal fin. Skin scaleless, lateral line present, forming an inconspicuous band along the middle of the side.

E t y m o l o g y:— $\mu\upsilon\rho\omicron\varsigma$, *Myrus*, the ancient name of a Mediterranean eel; $\pi\tau\acute{\epsilon}\rho\upsilon\varsigma$, a fin; $\omicron\upsilon\rho\acute{\alpha}$, tail.

MYROPTERURA LATICAUDATA, sp.nov.

Body slender, with the throat somewhat saccate, its depth $\frac{1}{3}$ of the length of the head, which is 3 to $3\frac{1}{2}$ in that of the trunk. Snout obtusely pointed, with the upper profile gently convex anteriorly and forming behind with the interorbital region a shallow concavity in front of the occiput, not projecting greatly beyond the lower jaw, its length $5\frac{1}{2}$ to $5\frac{1}{3}$ in the head and $2\frac{1}{2}$ times the diameter of the eye. Cleft of mouth extending to or a trifle beyond the vertical from the posterior border of the eye, its length, from the tip of the snout, $3\frac{2}{5}$ to $3\frac{3}{5}$ in the head. Both jaws with a double series of about six strong curved caniniform teeth anteriorly; lateral maxillary teeth biserial; the mandible with a single series of strong sharp lanceolate teeth inclined backwards; vomerine teeth uniserial, similar to those of the jaws and posteriorly concealed in a deep groove. Gill-opening directed obliquely backwards and downwards, its width equal to $1\frac{1}{2}$ diameters of the eye. Vent well in advance of the middle of the length, its distance from the extremity of the snout $1\frac{2}{7}$ to $1\frac{1}{3}$ in the length of the tail. Dorsal fin low, commencing well behind

the vent, the space between its origin and the tip of the snout $2\frac{1}{10}$ to $2\frac{1}{5}$ in the total length; anal fin higher than the dorsal, its outer border undulating, well developed anteriorly and postmesially; both it and the dorsal are very low towards the end of the tail, but are expanded and fan-shaped around its tip, where the height of the anal equals the length of the snout, the dorsal being somewhat lower.

Uniform pale reddish-brown, the fins lighter.

Etymology:—*Latus*, broad; *caudatus*, tailed.

There are two specimens from Fiji in the Macleay Museum, Sydney University, collected by Mr. Archibald Boyd. They measure respectively 248 and 260 millimeters.

OPHICHTHYIDÆ.

BASCANICHTHYS HEMIZONA, sp.nov.

Body terete and slender, its depth about half the length of the head, which is very small, $6\frac{2}{5}$ in the trunk. Snout with rounded profile, twice as long as the small eye, and projecting about $\frac{1}{5}$ of a diameter beyond the lower jaw. Cleft of mouth extending beyond the vertical from the posterior border of the eye, its length from the tip of the snout $3\frac{1}{5}$ in that of the head. Both jaws with a single series of strong conical teeth, a few of which in front of the lower jaw are recurved and slightly enlarged; vomerine teeth biserial and strong in front, uniserial and small behind. Gill-opening short, the length of the slit about half the width of the isthmus. Vent well in advance of the middle of the length, its distance from the extremity of the snout being $\frac{5}{7}$ of the length of the tail. Dorsal and anal fins low; the former commencing on the head, the space between its origin and the gill-opening $\frac{2}{3}$ of its distance from the extremity of the snout: pectoral well developed, its basal width $\frac{1}{3}$ of its length, which is about equal to the gape. Extremity of the tail hard and sharp, its free tip about as long as the diameter of the eye.

Pale yellow, with twenty-five or twenty-six large purplish-black spots on each side of the dorsal surface; these spots are sometimes

opposite and confluent, sometimes alternate, and more rarely split up in two or more narrower spots; the width of the spots is normally much greater than that of the intervening space; head lilac-brown above, gray below, ornamented with numerous darker mottlings, which are mostly round in front of and between the eyes, oval or elongate behind them.

Etymology:— $\eta\mu$, half; $\zetaώνη$, girdle.

A single specimen measuring 540 millimeters was obtained in Port Jackson and was preserved to science through the thoughtfulness of Mr. J. E. Chinnery, by whom it was purchased in the market and kindly passed on to the writer.

SYNODONTIDÆ.

GOODELLA, gen.nov.

Body elongate, slightly compressed, of almost equal depth throughout; abdomen with a narrow smooth band, separating the terminations of the muscular rings and deeply grooved along each side. Head small, with a short rounded snout. Cleft of mouth moderate, almost horizontal, the lower jaw included; chin without barbel. Premaxillaries long, rod-like, immovable, forming the entire dentigerous portion of the upper jaw; maxillary slender, not reaching so far back as the premaxillary. Jaws with a series of large, compressed, cultriform, rather distant teeth, between which are smaller teeth, one of which is larger than the others; vomer, palatines, and pterygoids toothless; border of the tongue anteriorly with strong teeth. Eye large, without adipose lid; interorbital region narrow and concave. Gill-openings wide, gill-membranes separate, narrowly attached to the isthmus in front; thirteen (or fourteen) branchiostegals; pseudobranchiæ present; gill-rakers minute and tubercular. All the fins well developed; dorsal fin premedian; adipose dorsal present, opposite to the anal; ventral large, eight-rayed, inserted well in front of the dorsal, the inner middle rays the longest; pectorals moderate, rounded, with eleven rays; caudal forked. No photophores or scales; lateral line present.

Etymology:—Named for Dr. George Brown Goode, whose early death in the very zenith of his powers is a source of the keenest regret to his many admirers and of irreparable loss to the cause of science.

GOODELLA HYPOZONA, sp. nov.

D. 12. A. 15. V. 8. P. 11.

Depth of body $10\frac{1}{3}$ to $10\frac{1}{2}$, length of head $5\frac{1}{4}$ to $5\frac{3}{4}$ in the total length; width of body $1\frac{1}{4}$ to $1\frac{1}{3}$ in its depth; interorbital region narrow and concave, from $\frac{1}{3}$ to $\frac{1}{4}$ of the diameter of the eye, which is $3\frac{1}{2}$ to $3\frac{3}{4}$ in the length of the head; snout shorter than the eye, with rounded profile. Premaxillary extending to below or a little beyond the vertical from the posterior border of the pupil, its length $2\frac{1}{5}$ to $2\frac{1}{3}$ in that of the head. The space between the origin of the dorsal and the extremity of the snout is $1\frac{1}{2}$ to $1\frac{3}{4}$ in its distance from the base of the caudal; the third and fourth rays are the longest, $2\frac{2}{5}$ to $2\frac{3}{5}$ in the length of the head and $1\frac{2}{3}$ to $1\frac{5}{6}$ in the basal length; adipose dorsal well developed, much longer than high, inserted above the third quarter of the anal and much nearer to the base of the caudal than to the rayed dorsal: the anal originates midway between the base of the caudal and the extremity of the ventral; the fourth ray is the longest, from $\frac{2}{7}$ to $\frac{1}{4}$ of the length of the base, which is longer than that of the dorsal: ventral large and pointed, the space between its origin and the tip of the mandibles $2\frac{1}{5}$ to $2\frac{1}{3}$ in its distance from the base of the caudal; the sixth ray is the longest, its length (from the base of the first ray) $1\frac{1}{5}$ to $1\frac{2}{5}$ in the head: pectoral $2\frac{1}{5}$ to $2\frac{2}{5}$ in the head; caudal forked, with the lobes subequal, $7\frac{1}{3}$ to $7\frac{1}{2}$ in the total length.

Colourless, except for a series of blackish dots along the lateral line, commencing above the middle of the pectoral and terminating about midway between the anal and caudal; these dots are larger and often concurrent on the tail; most of the dorsal and anal rays with a black dot at the base; two larger dots on the median line in front of and an interrupted series behind the dorsal fin; a

V-shaped triserial band of similar dots enclosing the front of the adipose dorsal; extremity of the tail with numerous densely crowded dots which extend further forwards above than below and are continued on the base of the caudal fin, forming a conspicuous black blotch; one or two dots above the base of the pectoral; occiput with several, opercle with two or three dots; sometimes a few dots below the eye; lower surface with six pairs of large dark blotches, the last four of which are confluent; a large quadrangular brown spot on each side of the throat below the opercles; a similar, but round or oblong, spot on each side more or less covered by the pectorals; sides of the abdominal cavity with four large black spots which are confluent below, and show through the translucent skin as bluish bands, the darker colour being apparent only along the edges of the abdominal grooves.

Washed ashore on the outer beaches in considerable numbers after stormy weather; all the specimens as yet obtained measure from 35 to 42 millimeters.

Type in the Australian Museum; register number, I. 3670.

That the specimens from which the above description is taken are immature is apparent from the soft state of the bones, even the vertebral column being incompletely ossified; but the complete absence of a scaly covering* is a character of such importance that I have no hesitation in describing and naming the species and genus as new, the more so that there is no synodont fish known from our coast of which it could be the fry.

* In *Harpodon*, a partially scaleless synodont from the tropical Indo-Pacific, the ventral fin is inserted below the dorsal, not well in advance of it as in *Goodella*.

NOTES AND EXHIBITS.

Mr. Fred. Turner exhibited specimens of, and communicated a note on, five interesting plants as follows :—

Helipterum floribundum, DC. Mr. G. Leaper, Manager, North Abbotsford Station, Mossgiel, writing on June 6th, 1897, says :—
 “I am forwarding to you by this mail a plant, locally known as ‘daisy,’ for your identification. It has for the last four years taken the place of grass, and has proved to be a grand feed for stock, retaining its greenness through all the drought. We have had no rain since the 10th of January.”

Mr. James Harold, who has been travelling in the far western portions of New South Wales and in the eastern parts of South Australia, brought to Sydney a number of interesting plants. Amongst them were the three following species of salt-bush :—

(1) *Atriplex vesicaria*, Hew., which is very plentiful and has supplied the principal feed for stock all through the recent drought. It is regarded everywhere as an excellent forage plant.

(2) *Kochia aphylla*, R.Br. All pastoralists regard this salt-bush as an excellent forage plant, but it is becoming scarce, and in fact has entirely disappeared from certain areas where it was once very plentiful.

(3) *Kochia sedifolia*, R.Br., which is plentiful on many pastoral holdings, but when sheep eat greedily of it balls of felt-like substance form in their stomachs and often cause their death. I have referred to similar circumstances in my “Indigenous Forage Plants of Australia,” in which all these plants are figured and described. Also,

(4) *Solanum chenopodium*, F.v.M., a suspected poisonous plant from the Barrier Ranges.

Mr. Steel exhibited a large specimen of *Polyporus Mylittæ*, C. & M., the "Native Bread," from Bundanoon, weighing 5½lbs., also several young fresh examples from 1-2 inches in diameter.

Mr. W. W. Froggatt exhibited portions of vine stakes covered with scars cut by Cicadas in which their eggs were deposited; each scar contained about 16 eggs forming a double row, and almost every stake in dozens of vineyards round Minto and Liverpool showed at least several cuts; the eggs had not developed, probably because they were deposited in dry wood. Also, on behalf of Mr. Gilbert Turner, a named collection of Ants from Mackay, Queensland, in illustration of a paper read at the last meeting.

Mr. Waterhouse exhibited a collection of Lepidoptera in illustration of his paper. Also examples of *Pamphila argiades*, Feld., showing varieties among the females.

Mr. E. R. Waite exhibited a living example of a dark variety of the Sydney Bush Rat (*Mus arboricola*, W. S. Macl.). In this specimen the parts usually of a brown colour are a dark grey, the longer hairs being black. It greatly resembles typical examples of *Mus rattus*, but may be externally distinguished by the longer ears and white under parts. Also shells of the introduced *Helix aspersa*, from the Society's garden, lent by Mr. Fletcher as a sample of large numbers so treated, in which the soft parts had been extracted by the rats; in all cases the apex of the shell had been attacked, the lip being untouched.

Mr. Ogilby exhibited the jaws and the small fish, *Goodella hypozona*, mentioned in his paper; and also a specimen of a young Conger (*Leptocephalus labiatus*) in the *Helmictis* stage.

Mr. Rainbow, through the kindness of Mr. Henry Deane, exhibited a second specimen of the beautiful spider, *Actinopus formosus*, Rainbow [P.L.S.N.S.W. 1896, p. 328], forwarded by Mr. A. G. Little, of Menindie, who obtained it at Brundah, near Grenfell, N.S.W. M. E. Simon has described (Semon's "Zoologische Forschungsreisen in Australien und dem Malayischen

Archipel." Lief. 8, p. 343) a species for which he proposes the names *Eriodon semicoccineum*, and which he thinks will prove to be synonymous with *Actinopus formosus*, Rainb., and should this prove to be so, the question will then be one of priority, as both descriptions were published in 1896. In so far as the question of generic determination is concerned, Simon's view of the position must be accepted, namely that of *Eriodon*. Semon's specimen was obtained at Burnett River, Queensland. *A. formosus* is now known to have a wide range, as specimens have been collected in Queensland, and at Coolgarlie, W. Australia.

Mr. Baker read a Note embodying some inquiries instituted respecting Eucalypts killed by the recent drought in certain districts, as reported in the newspapers. The evidence afforded by residents seemed to show that in most cases the trees which had died grew in rocky places where the soil was poor and shallow.

Mr. Brazier exhibited for Edwin H. R. Brazier a specimen of the Hawksbill Turtle (*Chelone imbricata*) obtained alive by him at Nelson Bay, Waverley, during the easterly gale of June 14, 1897. This is the first record of the species so far south, its usual habitat being Torres Straits, Solomon Islands, and the Line Islands. Also a specimen of *Planaxis mollis*, Sowb., with the whorls tabled below the suture which has the appearance of being canaliculated, more like an *Eburna*; obtained at Coogee, 30 years ago.

Mr. Fletcher exhibited a fresh specimen of *Viscum articulatum* parasitic upon a species of *Santalum*, forwarded from Narrabri, N.S.W., by Mr. C. T. Musson.

WEDNESDAY, 28TH JULY, 1897.

The Ordinary Monthly Meeting of the Society was held at the Linnean Hall, Ithaca Road, Elizabeth Bay, on Wednesday evening, July 28th, 1897.

Professor J. T. Wilson, M.B., President, in the Chair.

DONATIONS.

Bureau of Agriculture, Perth, W.A.—Journal. Vol. iv. No. 13 (June 16th, 1897). *From the Secretary.*

Pharmaceutical Journal of Australasia. Vol. x. No. 6 (June, 1897). *From the Editor.*

Société d'Horticulture du Doubs, Besançon—Bulletin. Série illust. No. 17 (Mai, 1897). *From the Society.*

Société Royale Linnéenne de Bruxelles—Catalogue, Concours d' Horticulture, Mai, 1897. *From the Society.*

Museo de la Plata—Anales: Palæontologia Argentina. No. iv. (1896); Seccion Antropologica. No. 1 (1896): Revista. Vol. vii. Part 2 (1896). *From the Director.*

Department of Agriculture, Victoria—Guides to Growers. No. 31 (May, 1897): Pamphlet, "Tuberculin Test" (May, 1897). *From Secretary for Agriculture.*

Department of Agriculture, Sydney—Agricultural Gazette of N.S. Wales. Vol. viii. Parts 5-6 (May-June, 1897). *From the Hon. the Minister for Mines and Agriculture.*

Field Naturalists' Club of Victoria—Victorian Naturalist. Vol. xiv. No. 3 (July, 1897). *From the Club.*

Hooker's "Icones Plantarum." Vol. vi. Fourth Series. Part 2 (1897). *From the Bentham Trustees.*

Zoologischer Anzeiger. xx. Band, Nos. 532-533 (May-June, 1897). *From the Editor.*

Perak Government Gazette. Vol. x. Nos. 12-14 (June, 1897). *From the Government Secretary.*

L'Académie Impériale des Sciences de St. Pétersbourg—Bulletin v^e Série. T. vi. No. 3 (Mars, 1897): Annuaire du Musée Zoologique, 1897. No. 1. *From the Academy.*

Royal Society, London—Proceedings. Vol. lxi. Nos. 371-373 (May, 1897). *From the Society.*

Zoological Society, London—Proceedings, 1897. Part 1: Abstracts, 18th May, 1st June, 1897. *From the Society.*

Australian Museum, Sydney—Memoir iii. Part 3 (July, 1897): Annual Report for the Year 1896. *From the Trustees.*

Department of Agriculture, Queensland—Queensland Agricultural Journal. Vol. i. Part 1 (July, 1897). *From the Secretary for Agriculture.*

Queensland Museum, Brisbane—Annals. No. 3 (1897). *From the Curator.*

Royal Society of N.S. Wales—Anniversary Address by the President (J. H. Maiden, F.L.S.), May 5th, 1897. *From the Author.*

Canadian Institute—Proceedings. New Series. Vol. i. Part 2 (May, 1897). *From the Institute.*

American Naturalist. Vol. xxxi. No. 366 (June, 1897). *From the Editor.*

Johns Hopkins University, Baltimore—Hospital Bulletin. Vol. viii. No. 74 (May): University Circulars. Vol. xvi. No. 130 (June, 1897). *From the University.*

U.S. Department of Agriculture—Farmers' Bulletin. No. 54 (May, 1897) *From the Secretary of Agriculture.*

American Museum, N.Y.—Bulletin. Vol. ix. Article xiii. (pp. 197-208, June, 1897). *From the Director.*

Royal Society of New South Wales—Journal. Vol. xxx. (1896). *From the Society.*

Royal Society of Victoria—Proceedings. New Series. Vol. x. Part i. (1897). *From the Society.*

Kansas University Quarterly. Vol. vi. No. 2. Series A (April, 1897). *From the University.*

Museo di Zoologia della R. Università di Torino—Bollettino. Vol. xii. Nos. 268-295 (Jan.-May, 1897). *From the Director.*

Zoological Society of Tokyo—Annotationes Zoologicae Japonenses. Vol. i. Partes 1-2 (1897). *From the Society.*

Société Géologique de Belgique—Annales. T. xxiv. 1^{re} Liv. (Mai, 1897). *From the Society.*

Two Pamphlets "Further Coccid Notes" and "On Tick-Parasites of the Kiwi" (1897). By W. M. Maskell, Esq. *From the Author.*

Gordon Technical College, Geelong—The Wombat. Vol. ii. No. 4 (July, 1897). *From the College.*

Australasian Journal of Pharmacy. Vol. xii. No. 139 (July, 1897). *From the Editor.*

Cambridge Philosophical Society—Proceedings. Vol. ix. Part 5 (1897). *From the Society.*

Royal Society of Tasmania—Papers and Proceedings for the Year 1896. (July, 1897). *From the Society.*

ON THE OCCURRENCE OF THE GENUS *PALÆCHINUS*
IN THE UPPER SILURIAN ROCKS OF
NEW SOUTH WALES.

BY JOHN MITCHELL.

The occurrence of echinoids in Palæozoic rocks is extremely rare, and those recorded have chiefly come from the Carboniferous, from which eight species have been described, all from Ireland and North America.* Two species have been described from Upper Silurian rocks, both of which are referred to the genus *Palæchinus*; but the fossils from which these were determined were fragmentary; and some eminent palæontologists seem to doubt whether the occurrence of echinoids in Silurian rocks has been satisfactorily established.† Therefore to establish beyond doubt their occurrence in the Silurian system of New South Wales would be of more than local interest. For this reason I am led to describe and figure a fragment of a fossil which to me appears clearly to belong to the *Palæchinidæ*.

Class ECHINODERMATA.

Order PERISCHOECHINIDÆ, McCoy (*Tesselata* Pom.).

Family PALÆCHINIDÆ, McCoy.

Genus PALÆCHINUS, Scouler.

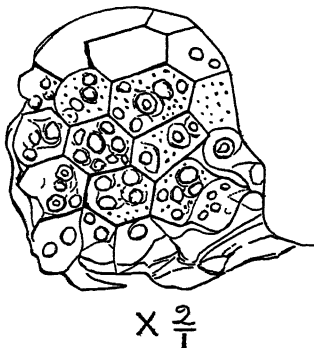
PALÆCHINUS sp.

Our fossil consists of a fragment of the middle part of an interambulacral area of four rows of plates. Of the two median rows, each contains four whole plates and a fragment of a fifth, and in each of the outer rows there are four fragmentary plates.

* Zittel. Handbuch der Palæontologie.

† H. Alleyne Nicholson, M.D., D.Sc., M.A., &c. The Ancient Life History of the Earth. 1876, p. 105.

Sp. Char.—*Plates* : Longer axis between the angular points in the larger plates equals 17-20 ninety-sixths of an inch, with a width of thirteen ninety-sixths between the parallel edges is very constant, highly granulated and tubercled, subconvex, edges firmly attached, sutures distinct; tubercles apparently seven on each, one central and the others peripheral, being placed adjacent to the angles, but this arrangement is only visible upon one or two of the most perfect plates. The contour of the whole is convex.



Obs.—This fossil in size of plates agrees with *P. ellipticus*, McCoy, from the Carboniferous of Ireland, but the tubercles are more pronounced and less in number in the former. That it is not a cystidean is plain by the absence of the ridges from the angles to the central point and of the parallel striation so characteristic of the plates of these fossils, as well as by the absence of any resemblance of the plates to the pyramidal form.

Its separation from the Crinoidea seems equally clear by the distinct tuberculation of the plates of the former and by their uniformity of character.

The plates of the calyx of *Platycrinus* are numerous, hexagonal and of varying size; but they increase rapidly in dimensions towards the base and are void of tuberculation; and thus disagree with the fossil under consideration.

In the absence of ambulacral and genital plates and other parts, it must be admitted that the determination is not altogether beyond doubt. I therefore refrain from giving it specific rank.

Loc.—Middle Trilobite Bed (= ? Wenlock); Yass Beds (David); Hume Beds (Jenkins). Bowning Village, County Harden.

TWO ORNATE BOOMERANGS FROM NORTH QUEENSLAND.

BY R. ETHERIDGE, JUNR, CURATOR OF THE AUSTRALIAN
MUSEUM, SYDNEY.

(Plate XI.)

I am indebted to Mr. J. A. Boyd, of Ripple Creek, near Ingham, North Queensland, for an opportunity of describing two additional carved Boomerangs. Mr. Boyd informs me that the weapons were procured from the Herbert River Blacks, who obtain them from the natives living farther south, near Townsville. Both are similar in size and shape, with plain obtusely pointed and non-emarginated apices, slightly convex on the sculptured face, practically flat on the reverse, showing only tool or gouge marks, whilst the former, or obverse, is smooth and polished like similar weapons in general. The length around the curve is two feet three inches; across from apex to apex two feet one inch; the width two, and two and a quarter inches respectively; and the weight of each is ten and a half ounces.

The wider of the two (fig. 1) bears on the obverse a line of half ovals along each margin, twelve on the convex, and eleven on the concave. The centre of the boomerang is ornamented by two lines of elongated ovals following the curve of the weapon, the row contiguous to the convex edge containing twelve, and that on the concave margin thirteen, ovals. All the ovals are incised with oblique grooves, and each re-entering angle along the convex edge bears two very obliquely placed nicks or notches. The apices bear v-shaped grooves reversed, two at one end, three at the other.

The second weapon (fig. 2) is similarly ornamented, except that only one line of ovals occurs along the centre of the boomerang; the re-entering angles are without notches, and the apices are not specially sculptured in any way. Between the almost median line of ovals, and the half-ovals of the convex margin, and near the centre of the weapon is an object apparently intended to represent a tree, with two transverse grooves below in imitation of the ground surface. A single long groove at right angles forms the stem, and suddenly enlarges into a bottle-brush-like head, terminated by a short wavy single line like the stem. The latter bears on each side three sets of upwardly directed off-sets, possibly intended for branches. On the flat reverse of this weapon, and at one end, are incised the outlines of two guns, one above the other and pointing in opposite directions, and apparently intended for old-fashioned percussion pieces.

Both boomerangs are distinct from any previously figured by me, although one (fig. 2) approaches the Section (*g*) of my first paper* on this subject. It differs, however, in the presence of a natural object—the tree (?), and the absence of emarginated apices and notches in the re-entering angles of the marginal scalloping. The second, on the other hand, is possibly allied to Section (*k*) of the before-mentioned paper, but the sculpture is bilaterally symmetrical, and there is an absence of cross-bars; still neither weapon can be placed in any of the sections of the paper cited, and yet further tend to show the great diversity of sculpture existing amongst these boomerangs.

On the different occasions when my former papers were written I had not access to Mr. J. Edge-Partington's "Album,"† and was therefore unable to refer to the figures therein illustrated when epitomising the different patterns of boomerang ornamentation known. Mr. Partington's Pl. 353, fig. 2, clearly belongs to the

* Proc. Linn. Soc. N.S. Wales, 1894, ix. (2), p. 198.

† An Album of the Weapons, Tools, Ornaments, and Articles of Dress of the Natives of the Pacific Islands, &c.; 3 pts. obl. London, 1890-95.

type of sculpture represented by loops returned upon themselves,* but differs from any I have figured in the absence of supplementary ornamentation. The same author's Pl. 353, fig. 3, is too indefinitely drawn to be determined with exactitude, but the figures delineated seem to consist of three series of alternating ovals or small rhombs, and is very possibly referable to my Section (*g*). Both are said to be from the north. A particularly wide boomerang† is figured from North Queensland, bearing an ornament quite different from anything I had before seen. Each margin of the weapon is bordered with a line of half-ovals, or half-rhombs, most probably the latter, and within these a concentric double line following the outline of the weapons. The median line is occupied by two or three fluctuating incisions from end to end. The apices of this boomerang are simple and non-mucronate.

As on former occasions, I am indebted to Mr. C. Hedley for the accompanying illustrations.

* Proc. Linn. Soc. N.S. Wales, 1894, ix. (2), Pt. 2, t. 15, f. 1; 1896, Pt. 1, t. 2, f. 1-4.

† Edge-Partington, *loc. cit.* t. 354, f. 15.

NEW AUSTRALIAN LEPIDOPTERA.

BY OSWALD B. LOWER, F.E.S.

GEOMETRIDÆ.

EUCHLORIS (Iodis) HYPOLEUCUS, n.sp.

♀. 42 mm. Head reddish-fuscous, lower half of face fleshy-white. Antennæ pale ochreous, fillet white, thorax and abdomen green, abdomen silvery-white beneath and towards anal segments above. Legs pale ochreous-whitish, posterior pair whitish, palpi porrected, terminal joint as long as second, pale fuscous, beneath whitish. Forewings elongate-triangular, costa arched, strongly at base, apex round-pointed, hindmargin oblique, hardly straight; bright grass-green; a broad whitish costal streak from near base to apex, becoming suddenly finely attenuated from middle to apex; a faint, slightly waved, whitish line, from beneath costa at $\frac{1}{4}$ to $\frac{1}{3}$ inner margin; a similar line from beneath costa at $\frac{2}{3}$ to $\frac{2}{3}$ inner margin, slightly curved outwards; a small reddish-ferruginous discal spot at $\frac{1}{3}$ above middle; a fine ferruginous hindmarginal line: cilia white, becoming ferruginous on terminal half. Hindwings with hindmargin slightly crenulate, more prominent in middle; an elongate reddish discal spot; second line as in forewings; hindmarginal line and cilia as in forewings. Underside of wings shining silvery-white.

North Queensland; one specimen (Coll. Lyell).

Between *byrsopa*, Meyr., and *megalopectera*, Lower; differing from the former by ground colour and absence of strigulation, and from the latter by the absence of lines and shape of wings.

MONOCTENIADÆ.

MONOCTENIA POLYSPILA, n.sp.

♂. 40 mm. Head ochreous-brown, antennæ ochreous, pectinations ochreous, apical half simple. Legs whitish. Thorax pale

greyish-ochreous, anterior half ochreous-brown, separation edged by a curved line of purplish-fuscous. [Abdomen broken.] Palpi whitish-ochreous, terminal joint fuscous except apex. Forewings elongate-triangular, costa straight, apex produced, hindmargin sinuate beneath apex, thence bowed, crenulate; pale ochreous-brown; markings whitish, edged with dull purplish-fuscous; 4 or 5 small whitish spots on costa between base and $\frac{1}{3}$, more or less edged beneath by several small purplish spots; a moderate costal spot at $\frac{1}{3}$, from which proceeds a row of smaller similar spots to inner margin at $\frac{1}{3}$; a larger somewhat triangular costal spot at about $\frac{2}{3}$, from which proceeds a dull purplish-fuscous band ending on inner margin at about $\frac{2}{3}$ in a similar spot, fascia narrowed beneath costa; a round costal spot just before apex, from which proceeds two rows of parallel spots, indicating subterminal and submarginal, ending at anal angle, middle spots much smaller than those on margins; a small purplish-fuscous spot at apex: cilia ochreous-brown, somewhat darker on basal half. Hindwings with the hindmargin slightly crenulate; colour and markings as in forewings, but median fascia somewhat thicker, and basal spots hardly perceptible, hairs of inner margin white. Wings beneath pale greenish-yellow, markings of upperside reproduced; a large roundish purplish spot near anal angle; an irregular spot of purplish-fuscous on costa of hindwings before apex; cilia dark purplish-fuscous becoming orange-tinted on parts and whitish on terminal third.

North Queensland; one specimen (Coll. Lyell).

SELIDOSEMIDÆ.

IDIODES (?) PYRRHOPA, n.sp.

♀. 28 mm. Head scarlet, antennæ, legs and palpi orange-yellow, tibiæ and tarsi banded with black, posterior legs paler. Thorax and abdomen deep coppery-fuscous, collar broadly pale yellow. Forewings elongate-triangular, costa straight, apex pointed, hindmargin strongly bowed in middle, sinuate beneath apex; deep coppery-fuscous; a broad yellow costal streak from base to apex, attenuated posteriorly, containing 3 or 4 irregular

fuscous spots on lower edge; veins in disc outlined with fiery red; a row of very obscure dark fuscous spots from beneath costal streak at $\frac{3}{4}$ to before anal angle; a dark fuscous hindmarginal line: cilia reddish-orange. Hindwings with hindmargin rounded; dark coppery-fuscous; cilia as in forewings. Wings beneath bright orange-yellow, forewings with a fuscous dot at end of cell, submarginal spots reproduced; a broad fuscous hindmarginal band, hindwings with a fuscous dot in middle and a broad fuscous hindmarginal band.

Waverley, near Sydney, N.S.W.; one specimen in April (Coll. Lyell).

I know of no Australian species of *Geometra* approaching this species in appearance; in shape of wing and markings it is not unlike one of the genus *Erosia* (*Noctuina*); but as it approaches *Idiodes* closely I place it there for the present.

STIBAROMA HEMADELPHA, n.sp.

♂. 38 mm. Head, palpi and thorax dark ashy-grey, thorax with anterior and median black transverse lines, interrupted by crest, posterior crests black above. Legs blackish, tibiae and tarsi banded with white, antennae greyish-ochreous, pectinations 3 at greatest length, apex simple; abdomen grey, anal tuft ochreous. Forewings elongate-triangular, hindmargin waved, somewhat bowed; dark ashy-grey-whitish; 3 moderate black lines; 1st from $\frac{1}{3}$ costa to $\frac{1}{4}$ inner margin, almost acutely angulated outwards above middle; 2nd slightly thicker (indicating median shade), almost parallel to first, excepting on lower half, where it diverges and ends on inner margin just before middle; 3rd from just beyond middle of costa obliquely outwards to above middle of wing, thence with a very strong sinuation inwards to middle of inner margin, with a slight projection outwards just above inner margin, faintly edged with whitish throughout; a strongly dentate white subterminal line, rather indistinctly traceable on lower third, anteriorly faintly edged with ochreous-brown; interspace streaked with fine black lines; a fine black

hindmarginal line: cilia ashy-grey, with a darker median line. Hindwings with the hindmargin unevenly waved, with a slight projection at anal angle; whitish; a blackish discal dot above middle, hindmarginal area suffused with fuscous, more pronounced at apex; a suffused, hardly traceable, waved hindmarginal line parallel to hindmargin; hindmarginal line as in forewings; cilia grey.

♀. (?) 32 mm. Differs only in position of third line of forewings, which is from before $\frac{3}{4}$ of costa to $\frac{2}{3}$ inner margin, and is gently curved inwards on lower $\frac{1}{2}$ and without any projection. The ochreous diffusion is absent as is the subterminal line.

This is a perplexing insect to locate correctly. It hardly agrees with the characters of *Stibaroma* on account of the antennæ and bifid posterior crests, a character only shared by *Paralæa*; but the palpi, which are very short, would remove it from that genus. It would appear to have some resemblance to *Gastrina*, but the absence of dilated femora is inconsistent with that genus. I am not certain that the insect described as the ♀ is not a distinct species; the balance of evidence appears to be in favour of its being so. A similar peculiarity in regard to the lines occurs in *melanotoxa*, Meyr.

Broken Hill, N.S.W.; the female in April, the male in June.

CECOPHORIDÆ.

EUCHÆTIS SARCOPTERA, n.sp.

♂. 25 mm. Head, palpi and thorax fleshy-ochreous, second joint of palpi internally whitish. Ciliations $3\frac{1}{2}$. Abdomen fuscous, strongly margined laterally with grey-whitish, four posterior segments somewhat lighter. Legs dark fuscous, tibiæ and tarsi irregularly ringed with whitish. Forewings moderate, hardly dilated, costa strongly arched towards base, hindmargin oblique; fleshy-ochreous, minutely dusted throughout with dark fuscous; costal edge light flesh from near base to apex, 3 irregular indistinct black dots, one near base, one immediately above and one below slightly larger; 2 distinct black dots at end of cell, one

above the other, a slightly curved row of 3 small obscure black dots before hindmargin in middle; a row of well-defined black dots along costa, and hindmargin to anal angle, commencing from just above dots at end of cell: cilia fleshy-ochreous, terminal half grey-whitish, separation effected by a line of fuscous. Hindwings greyish-fuscous, becoming lighter towards base; cilia grey-whitish, a fuscous median line round apex.

Mt. Macedon, Victoria; one specimen bred from piece of rolled bark of *Eucalyptus* sp., in March.

Recalls typical species of *Hoplitica* and *Heliocausta* in form of wing and markings.

HOPLITICA MELLICHRUA, n.sp.

♂. 22 mm. Head, thorax, antennæ, palpi and legs pale yellow, face lighter, posterior legs ochreous-whitish, collar fuscous-tinged, abdomen ochreous-grey. Forewings elongate, moderate, costa rather strongly arched, hindmargin very slightly sinuate beneath apex, thence oblique, 7 to immediately below apex; pale yellow; costal edge paler, a pale reddish-fuscous dot in disc at $\frac{1}{3}$ above middle; a second obliquely below and beyond, a third at end of cell in a line with first; an obscure row of reddish-fuscous dots along costal fourth and hindmarginal edge, continued to anal angle: cilia pale yellow. Hindwings and cilia pale yellow-whitish.

Mt. Macedon, Victoria; one specimen in February. Nearest *neochlora*, Meyr.

PHILOBOTA CYCLOGRAMMA, n.sp.

♀. 20 mm. Head and palpi ochreous-white, basal half of second joint of palpi blackish externally, antennæ black, annulated with white. Legs ochreous-yellow, anterior and middle tibia banded with black, thorax blackish-fuscous, patagia ochreous-white. Abdomen ochreous-fuscous, anal tuft orange. Forewings elongate, moderate, costa gently arched, hindmargin obliquely rounded; ochreous-whitish, with blackish fuscous markings, more or less margined with yellowish-orange; a thick outwards curved

fascia from base of costa to inner margin at $\frac{1}{4}$, emitting a tooth posteriorly which reaches $\frac{3}{4}$ across wing; a suffused spot on costa immediately above tooth, separated by ground colour; a thick irregular, outwardly oblique fascia from costa at $\frac{2}{3}$ to $\frac{2}{3}$ across wing; a similar, inwardly oblique fascia, dilated on costa, from costa at apex meeting termination of previous fascia, and emitting a slightly curved tooth before anal angle: cilia ochreous, strongly suffused with blackish and with an orange tooth just below apex and at anal angle. Hindwings dark bronzy-fuscous; cilia fuscous tinged with yellowish.

. Gisborne, Victoria; one specimen in February (Coll. Lyell).

In form of wing and markings it recalls both *ophiodes*, Meyr., and *sigmophora*, Meyr.

PHILOBOTA ANARRECTA, Meyr.

I have received a specimen of this species taken by Mr. G. Lyell, Junr., at Gisborne, Victoria, which presents some abnormal peculiarities by the curious structure of veins 4 and 5 of the forewings, which are each curved so as to anastomose at half their length, thus forming a small second cell; they then diverge and terminate as usual on hindmargin; the neuration is otherwise normal. The ochreous-yellow curved fascia from middle of third streak is very strongly infuscated.

CÆSYRA HEMIDESMA, n.sp.

♀. 18 mm. Head yellow, palpi yellow, terminal joint fuscous; thorax, abdomen, antennæ and legs dark bronzy-fuscous, posterior legs yellow. Forewings elongate, moderate, costa gently arched, apex round-pointed, hindmargin obliquely rounded; pale yellow, with dark bronzy-fuscous markings; a broad straight fascia from beyond middle of costa to beyond middle of inner margin, dilated on inner margin and touching hindmarginal patch; a hindmarginal patch, anterior edge hardly curved, paler and becoming yellowish anteriorly: cilia bronzy-fuscous. Hindwings and cilia dark bronzy-fuscous.

Gisborne, Victoria; one specimen in November (Coll. Lyell).

Not unlike a miniature *Philobota fascialis*, Fabr., but without the basal fascia.

ATHEROPLA CREMNOPELTA, n.sp.

♂. 18 mm. Head, palpi and thorax pale ochreous, second joint of palpi externally fuscous except apex, terminal joint as long as second. Legs ochreous-fuscous, suffusedly banded with white. Abdomen greyish-ochreous, anal tuft paler. Antennæ fuscous. Forewings elongate, moderate, costa gently arched, apex round-pointed, hindmargin hardly sinuate beneath apex, oblique; pale clear ochreous, markings blackish; a minute dot before $\frac{1}{2}$ of disc, and a second slightly beyond and beneath; a well-marked dot at end of cell; a row of well-defined spots along costa, continued right round hindmargin to anal angle, commencing immediately above dot at end of cell; a large quadrate spot just before anal angle: cilia ochreous, becoming darker on basal half. Hindwings pale grey; cilia as in forewings.

Hamilton, Victoria; one specimen in December.

Distinct from the other described species by the large anal spot.

CECOPHORA HYPOXANTHA, n.sp.

♀. 24 mm. Head, palpi and thorax deep reddish-fuscous, palpi very long, second joint suffusedly irrorated with white. Legs ochreous-whitish, posterior and middle pair yellowish-tinged. Forewings elongate, rather broad, slightly dilated, costa rather strongly arched on basal half, apex rounded, hindmargin obliquely rounded, 7 and 8 stalked, 7 to costa; deep reddish; extreme costal edge from near base to about $\frac{3}{4}$ pale yellowish; a blackish dot in disc at $\frac{1}{3}$, a second immediately below, and a third larger at $\frac{2}{3}$; a very ill-defined row of hindmarginal dots: cilia deep reddish. Hindwings bright yellow; a fuscous hindmarginal band, broadest at apex and along inner margin, almost obsolete in middle of hindmargin; cilia blackish.

Broken Hill, N.S.W.; one specimen in November.

A doubtful species; the palpi would seemingly require a new genus.

MACROBATHRA PLATYCHROA, n.sp.

♂. 15 mm. Head, palpi and thorax ochreous-yellow, thorax anteriorly black, basal portion of head black, terminal joint of palpi fuscous-tinged. Antennæ fuscous, annulated with white. Legs ochreous-whitish, banded with black. Abdomen fuscous, sides ochreous-whitish. Forewings elongate-lanceolate; black, with ochreous-yellow markings; a broad direct fascia from $\frac{1}{4}$ of costa to $\frac{1}{4}$ of inner margin, anterior edge straight, posterior edge slightly waved; a similar direct fascia from beyond middle of costa to beyond middle of inner margin, anterior edge with a short projecting tooth of ground colour in middle, posterior edge slightly waved; an irregular roundish spot on costa at apex, and a small spot at anal angle: cilia blackish. Hindwings and cilia blackish.

Gisborne, Victoria; exceptionally distinct; one specimen in January (Coll. Lyell).

XYLORYCTIDÆ.

XYLORYCTA CHRYSOMELA, n.sp.

♀. 32 mm. Head ochreous-yellow, palpi orange, terminal joint ochreous. Thorax yellowish-white, anterior half fuscous, collar orange-reddish. Abdomen orange; antennæ fuscous, annulated with white. Legs orange, tarsi banded with fuscous. Forewings elongate, somewhat dilated, costa gently arched, hindmargin oblique; 2 from $\frac{2}{3}$; 7 to hindmargin; whitish-ochreous, with dark fuscous markings; a broad oblique fascia close to base, dilated on inner margin; a moderate triangular spot on costa just beyond; a second moderate somewhat irregularly edged fascia from about middle of costa to middle of inner margin, broadly dilated beneath, costal portion connected with triangular spot by a thick streak which is continued along costa to $\frac{3}{4}$, and encloses one or two small spots of ground colour on costa; a third moderately thick curved fascia from posterior edge of this streak, ending just above inner margin on posterior edge of previous fascia; a thick streak from middle of posterior edge of third fascia to just below

apex, thence continued as a thick streak along hindmargin to anal angle; a small spot on costa at $\frac{1}{3}$; a triangular spot of fuscous in cilia at apex, containing 2 sharp black lines at base: cilia whitish-ochreous, basal half below fuscous spot orange, separation well-defined; a fuscous spot in cilia at anal angle. Hindwings orange, with an irregular fuscous band from just below costa at $\frac{3}{4}$ to anal angle, contracted posteriorly; cilia yellow, basal half orange.

North Queensland; one specimen (Coll. Lyell).

Between *ophiogramma*, Meyr., and *porphyrinella*, Walk.

SCIEROPEPLA ARGOLOMA, n.sp.

♀. 30 mm. Head, palpi, antennæ, thorax and abdomen fuscous, terminal joint of palpi $\frac{3}{4}$ of second, second joint sharply white on basal half beneath, basal joint of palpi white beneath. Legs white, tibiæ and tarsi infuscated, posterior legs ochreous-fuscous. Abdomen with greyish segmental rings. Forewings elongate, moderate, costa gently arched, apex round-pointed, hindmargin oblique, 7 and 8 stalked, 7 to costa; dark fuscous, suffusedly mixed with grey-whitish, lighter in disc; a moderate snow-white costal streak from very near base to $\frac{3}{4}$, attenuated at extremities; veins towards hindmargin suffusedly outlined with fuscous: cilia fuscous, with a darker line at base. Hindwings dark fuscous; cilia as in forewings.

Victoria; one specimen (Coll. Kershaw).

Rather an abnormal looking species, but undoubtedly rightly referred.

GELECHIADÆ.

PALTODORA (?) THERMÆA, n.sp.

♀. 20 mm. Head, palpi, antennæ and thorax ochreous-orange, second joint of palpi densely tufted, slightly fuscous-tinged beneath, terminal joint erect, apex acute, antennæ $\frac{3}{4}$ of wing. Abdomen yellowish. Forewings elongate, rather narrow, costa straight, apex rounded, hindmargin obliquely rounded; orange-yellow, deeper on margins, 7 and 8 to costa, stalked; a fine line of

fuscous at apex: cilia orange. Hindwings with hindmargin strongly sinuate beneath apex, apex produced; 3 and 4 from a point, 5 bent over to 4, 6 and 7 separate; black; cilia $1\frac{1}{4}$, blackish, costal cilia yellowish.

Sydney, N.S.W.; one specimen in October (Coll. Lyell).

GELECHIA (?) ISOSCELIANTHA, n.sp.

♀. 10 mm. Head, thorax and abdomen black, face ochreous, palpi long, terminal joint as long as second, strongly recurved, whitish-ochreous, terminal joint externally fuscous, second joint smooth, abdomen beneath whitish-ochreous. Legs whitish-ochreous, tibiae infuscated above. Antennæ fuscous, $\frac{3}{4}$ of wing. Forewings moderate, rather narrow, costa gently arched, apex pointed; black, with a yellow triangular spot on costa at $\frac{5}{8}$, reaching nearly $\frac{1}{3}$ across wing: cilia greyish, with 3 or 4 irregular lines of blackish round apical portion. Hindwings with hindmargin strongly subsinuate, produced, 3 and 4 approximated at base, 6 and 7 long-stalked; cilia 3, greyish-fuscous.

Broken Hill, N.S.W.: one specimen in middle of April.

Appears to approach the European genus *Ptochenusa*, Hein., in structure, and is not unlike *G. simplicella*, Walk.

PSORICOPTERA MELANOPTILA, n.sp.

♂-♀. 10 mm. Head and thorax dull whitish, thorax fuscous anteriorly, patagia white, palpi moderately long, fuscous; second joint internally whitish, apex of second joint with a broad whitish ring, terminal joint $\frac{3}{4}$ of second, apex white; antennæ fuscous, obscurely annulated with white, $\frac{3}{4}$ length of wing; abdomen greyish, becoming ochreous on median third. Legs fuscous. Forewings moderate, elongate, costa gently arched, apex pointed, hindmargin oblique, veins 1 furcate, 3 and 4 closely approximated at base, 7 and 8 stalked, 7 to costa; whitish tinged with ashy-grey, and with some ferruginous scales; 3 black tufts of scales, first in disc about middle, second just below, and third on anal angle, the latter one edged more or less with ferruginous; an

obscure blackish streak at base, obscurely continued along costa to next fascia; a moderate irregular obscure blackish fascia from costa at $\frac{1}{4}$ to first two tufts; a suffused blackish elongate mark along costa at about $\frac{3}{4}$, followed by an obscure blackish row of dots, which are continued round hindmargin to anal angle: cilia grey-whitish, with a few black and ferruginous points. Hindwings with hindmargin subsinuate; veins 3 and 4 approximated at base, 6 and 7 from a point, grey; cilia $1\frac{1}{4}$, grey.

Broken Hill, N.S.W.; several specimens beaten from *Solanum esuriale* in March and April.

The palpi of the present species hardly agree with the characters of *Psoricoptera*.

COPIDOSTOLA (?) ORTHOTIS, n.sp.

♀. 25 mm. Head, thorax and palpi pale fleshy-white, patagia dark fuscous, palpi strongly tufted, terminal joint short, erect, apex acute, apical half of terminal joint dark fuscous, second joint beneath black. Legs dark fuscous, posterior pair greyish, hairs of posterior pair long, greyish-ochreous. Abdomen greyish. Forewings elongate, moderate, apex pointed, hindmargin extremely oblique; 7 and 8 stalked, 7 to costa, 3 and 4 separate, 2 from before angle of cell; pale fleshy-white; a straight thick black streak from base to apex, attenuated posteriorly, well defined above, somewhat suffused beneath, suffusion becoming broader towards hindmargin and anal angle, where it has a tendency to become paler and outline the veins; a few fuscous lines along veins towards costa, hardly perceptible: cilia grey, with a pale fuscous basal line. Hindwings with hindmargin sinuate beneath apex; 3 and 4 separate, 5 bent over to 5, 6 and 7 nearly parallel; grey; cilia as in forewings.

Sydney, N.S.W.; one specimen (Coll. Lyell).

Recalls typical forms of the *Æcophoridæ* (especially *Leptocroca sanguinolenta*, Meyr.), to which family I would have referred it, but the sinuate hindmargin of hindwings and absence of pecten seemingly refer it to the *Gelechiadæ*.

ELACHISTIDÆ.

PTILOCHARES MELANOMA, n.sp.

♀. 22 mm. Head, palpi and thorax white, basal third of second joint fuscous, apex of terminal joint infuscated. Antennæ fuscous, annulated with white. Abdomen greyish-ochreous. Legs fuscous, irrorated with whitish, posterior pair with long grey-whitish hairs, banded with black. Forewings elongate-lanceolate, white, a thick very oblique blackish fascia at base; a paler and less distinct oblique fascia from $\frac{1}{3}$ of costa to beyond middle of inner margin; a similar fascia from costa at $\frac{3}{4}$ to before anal angle, the two last-mentioned fasciæ are connected by a black longitudinal streak in middle; a black elongate streak to apex, in a direct line with previous streak, and joining it by a very fine blackish line: cilia fuscous-whitish, with 2 fuscous basal teeth below apex and at anal angle, becoming white on terminal half on upper half of hindmargin. Hindwings narrower than forewings, lanceolate; fuscous; cilia $3\frac{1}{2}$, greyish-fuscous, without the fuscous teeth.

Stawell, Victoria; one specimen.

Recalls species of *Oxythecta* (*Æcophoridae*).

ON THE CINNAMOMUMS OF NEW SOUTH WALES:
WITH A SPECIAL RESEARCH ON THE OIL OF
C. OLIVERI, BAIL.

(Plate XII.-XIII.)

BY R. T. BAKER, F.L.S., ASSISTANT CURATOR, TECHNOLOGICAL
MUSEUM, SYDNEY.

Prior to this paper I can find no record of the occurrence in this colony of any indigenous representative of the Genus *Cinnamomum*; but now, after the most critical examination of the material that has come to hand, I am glad to announce that there are at least two species occurring in New South Wales, viz., *C. Oliveri*, Bail., and *C. virens*, sp.nov.

C. OLIVERI, Bail.

* "Black," "Brown," or "White Sassafras."

Systematic Notes.—This species was first described by F. M. Bailey, F.L.S., of Queensland, in his Bot. Bull. v. p. 24, thus:—

"*C. OLIVERI*, *n.sp.* (after Professor Daniel Oliver, F.R.S.) A tall tree, glabrous, except the inflorescence, trunk erect, bark smoothish, rather thin and fragrant. Leaves opposite or nearly so, lanceolate, attaining about 8 inches in length, and then scarcely over $1\frac{1}{2}$ inches broad in the widest part, colour pale, the apex blunt or minutely emarginate, on petioles of about $\frac{1}{2}$ inch, which are flattened, the upper surface glossy, the under surface of lighter colour, midrib flattish, the primary lateral nerves very oblique, few, the basal pair faint, and very near the margin until lost in the reticulation about half way up the leaf. Panicles

* To distinguish it from *Doryphora sassafras*.

slender, terminal, and in the upper axils, 2 or 3 inches long, of few branches, hoary or velvety hairy, branches few, with usually 2, 3, or 4 pedicellate flowers at the end of each branchlet. Perianth hairy on both sides, as are also the broad filaments of the stamens. Stamens all shorter than the perianth. Ovary and style glabrous; stigma peltate. The only fruit seen was much deformed by gall insect and fungus."

My material being complete I am enabled to add the following description of the fruit:—Oval in shape, measuring about $\frac{1}{2}$ inch long and under $\frac{1}{4}$ inch broad, resting in the enlarged perianth tube, the segments deciduous. They are, however, very often deformed by gall insects or fungus. Some of the "galls" measure as much as 2 inches in diameter, and are coated for $\frac{1}{8}$ inch or more with a micro-fungus *Melampsora nesodaphnes*, B. & Br., which is highly fragrant and has the appearance of a mealy powder of a canary-yellow colour. Under a one-eighth or one-tenth objective the hyphæ and spores are well brought out, the latter being oval or oblong in shape with a thick cell wall and "delicately granulated." After a time the substance of the "gall" becomes quite woody, and when the fungus is removed the surface is shown to be very irregular. An error has evidently been made in Cooke's "Australian Fungi," p. 333, under *Melampsora nesodaphnes*, B. & Br., and in all probability *Nesodaphne obtusifolia*, Benth., should read *C. Oliveri*.

The "galls" are very characteristic of the tree, and were known to me some years before I had sufficient evidence to identify the host. They occur on the trees both at Port Macquarie and Richmond River. The primary cause of this deformation of the fruits is not quite clear, as it may be due to either an insect or a fungus. It is still under investigation.

Bailey adds the following note to his description of the species: "From imperfect specimens I thought this tree only a form of Bentham's *Baileismiedia obtusifolia*, and under which name its wood and bark have been noticed in my Catalogue of Queensland Woods, No. 315. Professor D. Oliver, of the Kew Herbarium, to whom I sent specimens of the bark for the museum, and also

herbarium specimens, pointed out to me my mistake, and hinted at the probability of its being a *Cinnamomum*, which, from the examination of somewhat better specimens, I think is the case and record it as above, although even now the material is but imperfect. So far as at present known the tree is only met with in the scrubs of the Maroochie River. Of the bark, the late K. T. Staiger said it contained a tannin similar or identical with cinchona tannin; the amount, $7\frac{1}{2}$ per cent. One ton of the dry bark yields 770 oz. of oil."

Perhaps the above explanation in regard to the confusion of genera also holds good for this colony, for it certainly seems remarkable that this species in particular should have such an extensive range and yet should not have been previously recorded. I think it can only be accounted for as above stated, viz., that it has been mistaken for *Beilschmiedia* (*Nesodaphne*) *obtusifolia*, Benth., although it is hard to understand why this confusion has arisen, as the characteristics of the two genera are so very marked, and are so well defined in B. Fl. v. p. 294, that it is unnecessary to amplify them in this paper.

Complete material of both can be seen at any time in the Technological Museum.

The height of some of the trees at Mullumbimby is stated by W. Bäuerlen to be 120 feet, with a girth of $2\frac{1}{2}$ feet.

Timber.—The timber when freshly cut and dressed very much resembles that of "She Beech" or "Bolly Gum" (*Tetranthera reticulata*), or "Sycamore" (*Panax elegans*); and I do not doubt but that much of the timber passing under these names is really obtained from *Cinnamomum*. It is greyish in colour, with frequently a black stain running through it as though decaying. It has a straight grain, is light in weight, soft and easy working. It is very susceptible to the attacks of borers even to the very heart, and is therefore of no economic value.

Oil.—As soon as I diagnosed my specimens as a *Cinnamomum* I at once procured a quantity of the bark in order to ascertain its oil-yielding qualities. It is dark red in colour, brittle, about

$\frac{1}{2}$ inch thick, and aromatic,—particularly so when fractured. It was ground in a bark mill, and without any salt water maceration, placed in trays that permitted a free play of steam both above and below: the layer of bark was about 2 inches, a deeper layer not being so satisfactory in its yield of oil. It was then placed in the still and subjected to a steam distillation of 30 lbs. pressure in the boiler and 5 lbs. in the still. The distilled water was white and milky in appearance, the oil not separating freely, its specific gravity of course accounting for this. The first portion of the oil that came over floated on the top of the water, the second sinking to the bottom; the whole of the water being permeated with suspended globules of oil. Our receivers were much too shallow for this specific purpose, but if a deep receiver were used and fitted with a proper arrangement of taps, a return of over 1 per cent. could be easily obtained.

The first distillation (7th and 8th July, 1897) was made on 84 lbs. of ground bark, yielding $11\frac{1}{2}$ ozs. of oil or .85 per cent.

Second distillation (13th July, 1897), weight of bark 84 lbs., yielding $13\frac{1}{2}$ ozs. of oil, or 1.005 per cent.

Third distillation (15th July, 1897), weight of bark 120 lbs., yielding $14\frac{1}{2}$ ozs. of oil, or .75 per cent.

Total quantity of bark 288 lbs., giving a yield of $39\frac{1}{2}$ ozs. of oil, or .86 per cent.

As the oil contained impurities such as dirt and particles of bark, &c., it was strained first through a piece of calico and then through a filter paper, by which means I obtained a clear light golden-coloured oil with a tinge of green, and possessing a delicious odour.

The following chemical research on this oil was next undertaken by Mr. Henry G. Smith, F.C.S., Chemist of this Museum:—

The oil obtained in the three distillations gave the following results, severally and when mixed together:—

Specific gravity.—The oil of the first distillation = 1.0011 @ 16° C

„	„	second	„	= 1.0012 @	„
„	„	third	„	= 1.0010 @	„

The whole oil obtained when mixed together had a specific gravity of 1.00105 @ 16° C.

These determinations were made with a delicate pyknometer, holding about 12 grams.

Specific rotation.—This was taken in a tube 200 mm. long; using the sodium flame, the oils were found to be dextro-rotatory as follows:—

First oil—angle observed + 22.3 therefore $[\alpha] D + 11.137$.

Second oil „ + 22.2 „ $[\alpha] D + 11.080$.

Third oil „ + 22.0 „ $[\alpha] D + 11.000$.

These were then mixed, when the rotation was + 22.1, or a specific rotation $[\alpha] D + 11.038$. All taken at 16° C.

Redistillation.—100 c.c. of the oil were distilled at the ordinary atmospheric pressure with the following results:—Only a few drops had been obtained at 185° C, the mercury then rapidly rose to 204° C, between this and 213° C, 5 per cent. had been obtained.

Below 213° C*		5 per cent.	
First fraction collected.	Between 213	and 217.2° C =	7 „
	„ 217.2	„ 221.4° C =	8 „
	„ 221.4	„ 224.6° C =	7 „
	„ 224.6	„ 226.7° C =	7 „
	„ 226.7	„ 229.8° C =	7 „
	„ 229.8	„ 235 ° C =	16 „
Second fraction.	„ 235	„ 240.3° C =	17 „
	„ 240.3	„ 245.6° C =	11 „
Third fraction.	„ 245.6	„ 253 ° C =	10 „
Residue boiling above 253 ° C =		5	„

Evidently better fractions could be obtained by changing at 230° C as 54 per cent. distils between that temperature and 253° C.

* These temperatures have been corrected to the nearest decimal.

The fractions obtained as above gave the following results :—
First fraction, between 213° C and 235° C, had a specific gravity of .995 @ 16° C, being thus lighter than water. It had a specific rotation of $[\alpha]_D + 15.86$, or half as much again as that obtained for the whole oil.

Second fraction, between 235 and 245.6° C, had a specific gravity of 1.0166 @ 16° C, and the specific rotation was $[\alpha]_D + 5.066$, or less than half that obtained for the whole oil. It is perhaps remarkable that the fractions should have been thus separated, as the mean of the two rotations of these fractions is nearly that of the whole oil.

Third fraction, between 245.6 and 253° C, had a specific gravity of 1.004 @ 17° C. The material was not sufficient to enable the rotation to be taken.

The original oil is yellowish, inclining to brownish, with a tinge of green. The first two fractions are yellowish to brownish, while the third fraction is distinctly green.

When the original oil was subjected to the action of cold, a stearoptene crystallised out in small quantity, the temperature being 12 degrees below zero. It was not possible to separate it as it disappeared very quickly on removing from the freezing mixture, evidently melting below zero.

A portion of the oil was agitated with a solution of potash, the aqueous solution separated, and acidified with dilute sulphuric acid; no oil separated, but the solution was turbid; this was agitated with ether, the ether separated and evaporated, when a minute quantity of an oil was obtained, which became quickly brown, and which had a very strong odour of cloves. When dissolved in alcohol, ferric chloride gave the blue reaction. It is to be supposed, therefore, that the phenol is *Eugenol*, and that it is only present in traces.

A portion of the oil was mixed with a concentrated solution of acid sulphite of soda, and well agitated. A small quantity of a crystalline compound was obtained; this was separated entirely from adhering oil and acidified with dilute sulphuric acid in a graduated tube. The separated oil when measured equalled $1\frac{1}{2}$

per cent. of the original oil. It was of a dark brown colour and had the odour of cinnamon most markedly. It constitutes the material that gives the slight brownish tinge to the original oil, because when it was removed the oil was yellowish to greenish. The oil contains therefore less than 2 per cent. of *cinnamic aldehyde*.

None of the terpenes of low boiling point are present, nor could phellandrene be detected. A distinct reaction for cineol was obtained with iodol.

This oil, therefore, cannot be classed with the cinnamon oil of commerce, nor with cassia oil, as it is deficient in cinnamic aldehyde, although the principal constituents of those oils (cinnamic aldehyde and eugenol) were present.

Further researches are in progress to locate the principal constituent of this oil.

Mr. K. T. Staiger, in the Colonial and Indian Exhibition Report (1886, p. 11), gives the yield of oil of *C. Oliveri*, Bail. (under *Nesodaphne obtusifolia*, Benth.), as 2 per cent., obtained by a laboratory experiment, but which therefore can hardly be taken into account from a commercial point of view. As regards Dr. Lauterer's figures* (about .1 per cent.), these were also obtained in the laboratory from 10 lbs. of bark, and therefore are insufficient to determine definitely the commercial possibilities of distilling this oil. The results obtained at the Museum by us gave the actual yield obtainable on a commercial scale, and from them I am unable to endorse Dr. Lauterer's statement "that it never will pay even the expense to distil the essential oil out of the bark for commercial purposes."

I am of opinion that my own experiments point out that a profitable distillation of this oil is practicable, as there is only a little more difficulty in obtaining it than there is in extracting the oil from the leaves of the Eucalypts; a little extra patience only being required in separating the oil from the water of dis-

* Proc. Roy. Soc. Queensland. Vol. xi. p. 20.

tillation. Only bark from the stem was treated, but if the whole bark of a tree were distilled, and also the leaves and roots,—for each of these gives a distinctive oil,—then the total quantity of oil to be obtained from a tree of 70 or 100 feet (average height) would be considerable, and should prove a remunerative industry.

Efforts will now be made to obtain the exact value and commercial possibilities of this oil,—which we propose shall be known in future as Oliverian oil.

Dr. Lauterer states* that this bark is frequently used by bushmen to improve the flavour of their tea, a little bit of bark being infused therewith. This bark has been used by many medical men as a convenient aromatic astringent in diarrhoea, and has been recommended by the Medical Society of Queensland for insertion in the B.P.

Hab.—Mullumbimby, Tweed River (W. Bäuerlen); Port Macquarie (Forester Brown); and probably extends along the whole coast district to the Illawarra (C. Hedley).

CINNAMOMUM VIRENS, sp. nov.

“Wild Camphor Laurel.” “Copal Tree.”†

A tree about 90 feet high and up to 2 feet in diameter. Leaves opposite or occasionally alternate, rigid, coriaceous, shining above, green and glabrous on both sides, the reticulations prominent on the underside, lanceolate-acuminate, either cuneate or rounded at the base, margins nerve-like, 4 to 6 inches long, triplinerved but not prominently so, petiole rarely exceeding $\frac{1}{4}$ inch. Panicles opposite in the axils of the upper leaves, bearing a few flowers in the raceme shorter than the leaves, slightly pubescent. Pedicels the length of the calyx. Perianth tube about 1 line, segments or lobes 2 lines long, constricted for about half its length so as to give it a calyx-like appearance as soon as the ovules are fertilised. Stamens shorter than the lobes. Stigma very slightly

* *Loc. cit.* p. 24.

† On account of the high polish of the leaves and fruit.

expanded. Berry 6 lines long, 4 broad, resting on an enlarged perianth tube measuring across the top almost 5 lines, shining. Pedicels enlarged under the fruit, the whole resembling some *Quercus* fruits and cups such as *Q. pedunculata*, &c.

Hab. — Tintenbar, Mullumbimby, Dunoon, Gonellah (W. Bäuerlen).

This species was first collected at Lismore by W. Bäuerlen. It differs from *C. Oliveri* in its foliage, the uniform colour of the upper and lower surfaces of its leaves giving it a distinctive character from those of that species, which are dark green coloured on the the upper surface and whitish below. The neuration found in most other *Cinnamomum*s is slightly developed in this species, although wanting in *C. Oliveri*. Some specimens preserve a light green colour, others darken a little, but the colour is always distinct from *C. Oliveri*, Bail., *C. ovalifolium*, Wight, *C. Tamala* Nees, and *C. Zeylanicum*, Nees; the leaves are also thicker, more rigid, and less fragrant than those of *C. Oliveri*.

The bark is thin, non-aromatic, and a distillation of 60 lbs. gave very little oil.

The remarks on the timber of *C. Oliveri* are also applicable to this species.

It differs from *C. Tamala*, Nees, the only Australian representative of this genus recorded in B. Fl. v. 303 (allowing for all variations), in the shape, colour, size and venation of the leaf, as well as in the characters of the stigma; from *C. ovalifolium*, Wight, in its lanceolate, unicoloured, glabrous leaves, which are also less coriaceous than those of that species.

The perianth is very much more enlarged and thickened than in *C. Oliveri*, Bail., which has an entire and thin-edged enlarged perianth tube, whilst this one appears to show rudimentary lobes. The fruits also are larger than those of *C. Oliveri*, Bail., and very shining.

F. M. Bailey (in Bot. Bull. v. p. 25) refers to a probably new species of *Cinnamomum* under the name of *C. propinquum*, but I do not think that my specimens can belong to that species, as the branchlets are not 4-angled, neither are the leaves ovate-lanceolate;

they are nearly all above 3 inches long, and the under surface is not whitish but green, the same as the upper surface, with the reticulations distinct.

My species has very little affinity with *C. ovalifolium*, Wight, specimens of which have been kindly sent to me for comparison by Mr. J. C. Willis, M.A., Royal Botanical Gardens, Ceylon.

I have to tender my thanks to Dr. W. Prain, of the Royal Botanic Gardens, Seebpore, Calcutta, for kindly sending me specimens of *C. Tamala*; to Mr. J. C. Willis, M.A., of the Royal Botanic Gardens, Ceylon, for specimens of *C. ovalifolium*; to Mr. F. M. Bailey, F.L.S., for specimens of the Queensland Cinnamon, *C. Tamala*; to Mr. J. H. Maiden, F.L.S., Sydney Botanic Gardens, for specimens of *C. Zeylanicum*; and also to Mr. G. Beyer, for valuable assistance in the preparation of this paper.

EXPLANATION OF PLATES.

Plate XII.

Cinnamomum Oliveri, Bail.

- Fig. 1.—Terminal twig with inflorescence.
- Fig. 2.—Individual flower (enlarged).
- Fig. 3.—Stamen (enlarged).
- Fig. 4.—Staminodia (enlarged).
- Fig. 5.—Glands at base of inner perfect stamens (enlarged).
- Fig. 6.—Pistil.
- Fig. 7.—Cluster of fruits on enlarged perianth.
- Fig. 8.—Galls, coated with fungus.
- Fig. 9.—Spores and hypha of *Melampsora nesodaphnes*.

Plate XIII.

Cinnamomum virens, R.T.B.

- Fig. 1.—Inflorescence.
- Fig. 2.—Twig with more mature flowers than No. 1, and also early fruits.
- Fig. 3.—Individual flower from No. 2 (enlarged).
- Fig. 4.—Stamens, inner and outer series (enlarged).
- Fig. 5.—Stamen, outer series (enlarged).
- Fig. 6.—Staminode (enlarged).
- Fig. 7.—Pistil (enlarged).
- Fig. 8.—Early fruit (enlarged).
- Fig. 9.—Fruit on enlarged perianth (enlarged).

THE RHOPALOCERA OF LORD HOWE ISLAND.

BY G. A. WATERHOUSE.

In my opinion this portion of the fauna of Lord Howe Island has been sadly neglected, and the object of this paper is to aid investigations in the study of the distribution of species. There are three collections of Lord Howe Rhopalocera in Sydney at present. In 1889 in the second Memoir of the Australian Museum a list was given by Mr. A. S. Olliff comprising ten species; these specimens are in the Australian Museum. The second collection is a small one, consisting of five species, in the Macleay Museum, Sydney University. This collection is part of one made by Mr. E. H. Saunders in the early part of 1888, and contains three species not mentioned in Mr. Olliff's list. The remaining collection now in my possession was made by Miss Edith Nichols, a resident of the island, during the years 1896 and 1897, and consists of twelve species, five of which are not represented in either of the preceding collections. The list given by Mr. Olliff comprised all the information up to that date, so it will be seen that I have to record eight species new to the island.

All the species so far found on the island are common on the Australian continent, and are mostly strong winged insects, such as could easily have flown or been blown across the three hundred miles which intervene between the island and the mainland. One noticeable feature is the absence of any form of the subfamily *Satyrinae*, but this is scarcely to be wondered at, as these butterflies are very quiet, and do not soar high, consequently they are not so prone to be distributed over wide areas by the agency of the wind. The *Hesperiidae* are only represented by one small species, and this is a matter of surprise, as the Lord Howe palms are the food-plants of several of the family near Sydney. The

genus best represented is *Danais*, three out of the five Australian species being recorded. In conclusion, I do not think this list comprises all the insects to be found on the island, and I hope at some future time to add to it by means of my friends on the island.

Subfamily DANAINÆ.

DANAIS ERIPPUS, *Cramer*.—This species is one that has almost certainly been blown on to the island. Its real home is in South America, from which place it has spread both eastwards and westwards; since 1870 it has been a very familiar insect about Sydney. In this same year, it is said to have been seen on Lord Howe Island.*

DANAIS PETILIA, *Stoll*.—This species is mentioned by Mr. Olliff, and is also amongst those in my collection.

DANAIS HAMATA, *Macleay*.—One very fine specimen caught by Miss E. Nichols.

Subfamily NYMPHALINÆ.

PYRAMEIS ITEA, *Fabr*.—One specimen in my collection.

PYRAMEIS CARDUI, *Linn.*, var. *KERSHAWI*, *McCoy*.—Common.

JUNONIA VELLIDA, *Fabr*.—This is certainly the commonest butterfly on the island.

DIADEMA BOLINA, *Linn*.—Several specimens have been taken at various times.

CHARAXES SEMPRONIUS, *Fabr*.—The only record of this insect is by Mr. Olliff.

Family LYCÆNIDÆ.

LUCIA LUCANUS, *Fabr*.—One specimen taken by Mr. E. H. Saunders.

LAMPIDES BÆTICUS, *Linn*.—Rather common.

* "Australian Butterflies," by A. S. Olliff, p. 10.

LAMPIDES ARGIADES, *Pallas*.—One specimen in my collection.

LYCÆNA LABRADUS, *Godart*.—Very common.

HOLOCHILA XANTHOSPILOS, *Hüb.*—One specimen taken by Mr. E. H. Saunders.

Subfamily PIERINÆ.

TERIAS SMILAX, *Don*.—Miss E. Nichols tells me that at times this insect is abundant.

CALLIDYRAS PYRANTHE, *Linn.*—One specimen in my collection.

Subfamily PAPILIONINÆ.

PAPILIO ERECTHEUS, *Don*.—This butterfly is very plentiful, and its larvæ are to be found feeding on the orange trees.

PAPILIO MACLEAYANUS, *Leach*.—When I visited the island during Christmas, 1895, I found this butterfly abundant. It was flying about on the summits of the smaller hills. The Lord Howe form seems to differ slightly from the typical Australian form, in that it is lighter in colour and that the spots along the outer margins of both wings are larger and more numerous.

Family HESPERIDÆ.

APAUSTUS AGRAULIA, *Hewitson*.—One specimen taken by Mr. E. H. Saunders.

STRAY NOTES ON PAPUAN ETHNOLOGY.

PART II. (*Continued from Vol. x. (2), p. 617*)

BY C. HEDLEY, F.L.S., CONCHOLOGIST TO THE AUSTRALIAN
MUSEUM.

(Plates XIV.-XV.)

III. A PALU HOOK.

In a recent article on the Ethnology of Funafuti,* I have had occasion to review in detail from the Ellice, and in general from the Pacific, a gigantic wooden fish hook, commonly miscalled a shark hook.

The fish in whose capture it is employed is possibly a species unknown to naturalists, for the only description of it with which I am acquainted is an account, couched in popular language, by Mr. Louis Becke,† the well known writer of South Sea tales. This description suggests to my colleague Mr. E. R. Waite that it may be one of the family Macruridæ; it certainly is no shark.

The "Palu," as it is called in the Ellice, is a fish six feet in length and a hundred and fifty pounds in weight, shaped like an Australian Jewfish, with a tough black skin covered with large silvery curled scales, with large eyes and toothless (?) jaws. It lives on the sea floor at depths of from 80 to 100 fathoms.

On Nanomana palu fishing is conducted with superstition and ceremony. Strict silence is enjoined when fishing, the take is restricted to two by each canoe, and these are equally divided among everybody, a relic possibly of earlier communism.

* Memoirs of the Australian Museum, iii. 1897, The Atoll of Funafuti, p. 272, figs. 39, 40.

† Mem. Aus. Mus. *op. cit.* p. 199.

Under different forms the palu hook can be traced from the South Central Pacific, through the Gilberts and Marshalls to the Carolines. South and west of this there is but occasional evidence of its occurrence in the area inhabited by Melanesian races; an aberrant type has been figured from Fiji by Edge-Partington and another variation from the Louisiades by Macgillivray. Nearer than any, both in form and in geographical position, to that we are about to consider, is a specimen shown by Finsch from the Trobriands.* This, also without a barb, corresponds in size, in the hook which terminates the barb limb and in the other limb being of even thickness throughout.

The present hook (figs. 1, 2) was obtained by Mr. Norman Hardy, specimens from whose collection have so frequently been the subject of communication to this Society, and who has kindly entrusted it to me for description. He recently purchased it in Samarai, British New Guinea, from a trader who said that it came from Milne Bay.

This hook reached me unfortunately without the barb; it weighs a pound and a half, in total length it is nineteen inches, and in greatest breadth seven and a half. The two limbs are nearly square in section, of equal length, twelve inches, the elbow from which they branch is bulbous, especially in profile. The hook limb is much scratched half way down on its outer side by the gnawing of captured fishes; seven inches from the end the limb is cut down to a small shoulder, obsolete on the inner side; this certainly has reference to the length of the barb. The head of the barb-limb terminates in a chin directed towards the other limb and evidently intended to fit against the barb. As I have shown in discussing the subject elsewhere, local characteristics reside in the method of applying the barb to the shank. Though the barb itself is lacking and though I have no information relating to it, I have ventured to suggest its probable size and position by dotted lines in the accompanying illustration (fig. 1).

* Finsch, *Ethnological Atlas*, 1888, Pl. IX. f. 9.

The most bizarre feature of the hook and that which separates it the widest from its congeners is the loop for the attachment of the fishing line (fig. 2). To detach this is impossible without destroying much of the value of the specimen from an ethnological aspect, but I have ascertained by thrusting a pen-knife under the lashing that the limb holds it by no knobs or projections, but carries the same breadth to the end. The neatness and strength of the wicker lashing is characteristic of Papuan workmanship, and is like that used on adze heads. A wooden hoop, whose end is seen projecting in the drawing, is bent over the end of the limb and served round with a split cane (?) of a species unknown to me, leaving an eye two and three quarters by one and three quarter inches for the reception of the fishing line. This is cross-seized with cane at the end of the limb and again four inches lower down. This fastening cannot be moved or shaken by any force I could apply, and is apparently intended to resist and has resisted great strain in drawing weighty fish to the surface.*

IV. A WAIST BAND KNOT.

The most superficial of readers or of travellers in the Pacific cannot fail to possess some acquaintance with the garment known to Europeans as the "grass petticoat" and to Polynesians as the "titi." Throughout the Pacific it is the usual woman's dress, and may be generally described as a belt from which depend strips or bunches of fibre. It has long been known that between one island and another considerable difference exists in the local dresses in the way of material, length and colour.

In studying the dresses from Funafuti, I found that distinctions occurred also in the mode in which the strands are knotted to the waist belt. On this point I have met with no previous observations, and I therefore described and figured the Funafuti pattern in detail.

* *Postscript.*—Since the above was read, Mr. Hardy has generously presented this interesting specimen to the Australian Museum.

On dissecting the waist band of a New Guinea dress, I find another knot so different and so complicated that it also seems worthy of publication. Other knots have since come under my notice, and I can commend the subject to students as likely to repay careful investigation. A trifle like one of these knots might serve to trace migrations or affinities, for these would exclusively descend from woman to woman—there as elsewhere the most conservative element in the population. Every collection is well supplied with material, and these dresses are among the last of native fabrics to be obliterated by European civilisation.

The dress containing the knot to be described is a kind usual in East British New Guinea, dyed in alternate vertical stripes, with a scalloped flounce at a quarter depth. Inside (fig. 3) the belt shows the fibres as if in two beaded rows, outside (fig. 4) the fibres appear caught in a chain stitch. A glance at the exterior gives no idea of the intricate knot shown unravelled (fig. 5). Two bundles of fibres are disposed in a series of three. The waist band of the titi is always of two strings. Over the lower is hitched the two fibre bundles; then dividing they receive between them the fibres of the preceding series; closing again, they divide the succeeding pair; then passing over the top cord, they descend behind the second and third pairs, and opening out contribute to the skirt of the dress.

EXPLANATION OF PLATES.

Plate xiv.

Figs. 1 and 2.—Palu hook from front and side.

Plate xv.

Fig. 3.—Inside belt of titi.

Fig. 4.—Outside of same.

Fig. 5.—Knot unravelled.

NOTES AND EXHIBITS.

Mr. Mitchell exhibited some nature prints of Australian leaves on sensitised paper; and he suggested that this method of printing might be adopted with advantage by botanists and others where leaves are to be illustrated.

Mr. Hedley showed the fish-hook and grass petticoat of Papuan manufacture described in his paper.

Mr. Baker exhibited botanical specimens, and samples of timber, bark, and essential oil of two species of *Cinnamomum* to illustrate his paper.

WEDNESDAY, AUGUST 25TH, 1897.

The Ordinary Monthly Meeting of the Society was held in the Linnean Hall, Ithaca Road, Elizabeth Bay, on Wednesday evening, August 25th, 1897.

Professor J. T. Wilson, M.B., President, in the Chair.

DONATIONS.

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DESCRIPTIONS OF AUSTRALIAN MICRO- LEPIDOPTERA.

By E. MEYRICK, B.A., F.Z.S.

XVII. ELACHISTIDÆ.

For this and ensuing papers I shall assume as a basis the general classification and terminology employed in my "Hand-book of British Lepidoptera," thus avoiding the necessity of a certain amount of repetition. However, I give the family and generic characters in full.

The following are the characters of the family :—

Head smooth. Tongue developed. Antennæ $\frac{2}{3}$ to over 1. Labial palpi nearly always acute, recurved when long. Maxillary palpi rudimentary. Forewings: 1b furcate or simple, 7 usually to costa, one or more veins often absent. Hindwings under 1, lanceolate or linear; 3 usually rising before angle, nearly parallel to 4, rarely connate, 6 and 7 approximated, stalked, or coincident, one or more veins often absent, cell often open posteriorly.

The species of this family are almost all small, and therefore often neglected by collectors. It is probable therefore that very many remain to be discovered; and indeed I possess specimens of quite twenty species which are not in a satisfactory condition for description. I have however recorded here 254 species, almost the whole of which are new to science.

Larva with 10 prolegs, seldom almost apodal; usually mining in leaves or amongst seeds or in stems, sometimes case-bearing, rarely amongst spun leaves. •

The genera may be tabulated as follows :

- | | |
|---|----|
| 1. Forewings with 7 to termen, all veins present..... | 2. |
| Forewings with 7 to costa, one or more veins often
absent..... | 3. |

- | | |
|--|-------------------|
| 2. Forewings with 6 out of 7; antennal ciliations long (3)..... | 36. NOTODRYAS. |
| Forewings with 6 separate; antennal ciliations short..... | 37. EPERMERIA. |
| 3. Palpi straight, porrected or drooping, or rudimentary..... | 4. |
| Palpi curved, ascending..... | 8. |
| 4. Palpi rudimentary..... | 28. PSELIANTIS. |
| Palpi developed..... | 5. |
| 5. Forewings with 8 absent..... | 6. |
| Forewings with 8 present, out of 7..... | 31. LOZOSTOMA. |
| 6. Forewings with 6 and 7 separate..... | 30. HOPLOPHANES. |
| Forewings with 6 and 7 stalked..... | 7. |
| 7. Forewings with 3 absent..... | 29. PROPHYLACTIS. |
| Forewings with 3 present..... | 27. HELIOZELA. |
| 8. Forewings with tufts of raised scales on surface... | 9. |
| Forewings without tufts of raised scales | 15. |
| 9. Antennæ over 1 | 22. CORACISTIS. |
| Antennæ less than 1..... | 10. |
| 10. Basal joint of antennæ dilated to form eyecap..... | 26. ORTHROMICTA. |
| Basal joint of antennæ not dilated..... | 11. |
| 11. Second joint of palpi with strong tuft beneath ... | 25. TRACHYDORA. |
| Second joint of palpi not tufted..... | 12. |
| 12. Posterior tibiæ smooth-scaled... .. | 21. AERAULA. |
| Posterior tibiæ rough-haired..... | 13. |
| 13. Forewings with all veins present..... | 24. SYNTOMACTIS. |
| Forewings with one or more veins absent..... | 14. |
| 14. Forewings with one vein absent..... | 20. MOLYBDURGA. |
| Forewings with two or more veins absent..... | 23. MICROCOLONA. |
| 15. Antennæ over 1..... | 1. CORYTHANGELA. |
| Antennæ 1 or under 1..... | 16. |
| 16. Antennæ thickened with scales towards base..... | 32. ERETMOCCERA. |
| Antennæ not thickened with scales. | 17. |
| 17. Basal joint of antennæ dilated to form eyecap..... | 18. |
| Basal joint of antennæ not dilated... .. | 20. |
| 18. Antennæ in ♂ with very long ciliations..... | 19. |
| Antennæ in ♂ simple..... | 6. CALICOTIS. |
| 19. Anterior tibiæ and tarsi dilated with scales..... | 8. VANIGELA. |
| Anterior tibiæ and tarsi not dilated. | 9. HIEROMANTIS. |
| 20. Posterior tibiæ with large triangular median tuft above..... | 12. PERSICOPHTA. |
| Posterior tibiæ without tuft. | 21. |
| 21. Forewings with 6 out of 7..... | 22. |
| Forewings with 6 not out of 7..... | 30. |

22. Forewings with 2-5 all present.....	23.
Forewings with 5 and sometimes 4 absent.....	28.
23. Forewings with 8 absent.....	24.
Forewings with 8 present.....	25.
24. Hindwings with 2, 4, 7 absent.....	33. TINAGMA.
Hindwings with all veins present.....	34. SCYTHRIS.
25. Terminal joint of palpi longer than second.....	26.
Terminal joint of palpi shorter than second.....	27.
26. Hindwings with 4 and 5 absent.....	14. COSMOPTERYX.
Hindwings with 4 and 5 present.....	15. PYRODERCES.
27. Antennæ 1.....	4. RHADINASTIS.
Antennæ $\frac{4}{5}$	3. HAPLOCHROIS.
28. Hindwings with 5 present.....	2. BATRACHEDRA.
Hindwings with 5 absent.....	29.
29. Terminal joint of palpi longer than second.....	14. COSMOPTERYX.
Terminal joint of palpi shorter than second... ..	13. ELACHISTA.
30. Forewings with 5 or 6 absent.....	31.
Forewings with 2-6 all present.....	32.
31. Antennæ in ♂ with suprabasal notch and projec- tion... ..	17. OTONOMA.
Antennæ in ♂ normal.....	2. BATRACHEDRA.
32. Forewings with 9 absent.....	19. ZAPYRASTRA.
Forewings with 9 present.....	33.
33. Terminal joint of palpi longer than second.....	34.
Terminal joint of palpi not longer than second....	35.
34. Antennæ in ♂ with sinuation above base.....	16. GLAPHYRISTIS.
Antennæ in ♂ without sinuation.....	18. LIMNOECIA.
35. Antennæ 1.....	7. CUPHODES.
Antennæ less than 1.	36.
36. Antennæ in ♂ with long ciliations (4-5).....	10. STATHMOPODA.
Antennæ in ♂ shortly ciliated or simple.....	37.
37. Hindwings with 6 absent.....	38.
Hindwings with all veins present.....	11. AEOLOSCELIS.
38. Antennæ of ♂ simple; cilia of hindwings 8.....	5. PACHYRHABDA.
Antennæ of ♂ ciliated; cilia of hindwings 2.....	35. ENDROSIS.

1. CORYTHANGELA, n.g.

Crown of head long. Antennæ over 1, thickened towards base, in ♂ simple, basal joint thickened with rough scales anteriorly. Labial palpi long, ascending, smooth-scaled, terminal joint shorter than second, subacute. Posterior tibiae rough-haired. Forewings:

1b simple, 4 absent, 5 absent, 6 and 7 stalked, 7 to costa, 8 absent. Hindwings $\frac{1}{2}$, linear, cilia 6; transverse vein partly absent, 4 absent.

Closely allied to the very large northern genus *Coleophora*, of which it is a development, differing chiefly in the antennæ, which are longer than the forewings instead of shorter. Imago with forewings very elongate-lanceolate; in repose the antennæ are directed forward as in *Coleophora*. Larva inhabiting a portable case, within which pupation takes place.

1. *C. galeata*, n.sp.

♂♀. 8-13 mm. Head brown mixed with whitish, with a lateral white streak. Palpi white, second joint dark fuscous above. Antennæ white, spotted with brown above. Thorax brown mixed with whitish, shoulders white. Abdomen fuscous-whitish. Legs fuscous, hairs of posterior tibiæ whitish, posterior tarsi ringed with white. Forewings brown, with golden-yellow reflections; a thick costal streak from base to $\frac{4}{5}$, and more or less developed usually thick streaks on veins shining white: cilia whitish-fuscous. Hindwings pale grey; cilia whitish-fuscous.

Sydney, New South Wales; October to February; ten specimens. Larva on *Casuarina suberosa*, boring into the twigs in November; case long, slender, formed of several superadded sections of bored twigs of the foodplant. Imago retired in habits, but occurs at rest on fences.

2. *BATRACHEDRA*, Staint.

Antennæ $\frac{5}{8}$ to almost 1, in ♂ simple. Labial palpi long, recurved, second joint with scales more or less angularly projecting beneath at apex, sometimes with well-developed tuft, terminal joint as long or shorter, somewhat roughened anteriorly, acute. Posterior tibiæ rough-haired. Forewings: 1b fuscate (sometimes obsoletely), 5 absent, 6 and 7 sometimes stalked, 7 to costa, 8 absent. Hindwings $\frac{1}{2}$, linear-lanceolate or linear, cilia 5-8; transverse vein partly absent, 3 and 4 sometimes absent, 5 and 6 stalked or coincident.

This genus, represented by a very few species in the other main regions, is much more considerably developed in Australia than elsewhere, but is also fairly represented in New Zealand. The species are mostly inconspicuous and often retired in habit. Imago with forewings very elongate, narrow, long-pointed; in repose the forepart is usually somewhat raised, the anterior legs rather withdrawn beneath the body. Larva usually feeding on seeds (in many of the Australasian species probably on seeds of *Juncus*).

- | | |
|--|---------------------------|
| 1. Palpi with large dense projecting tuft..... | 2. <i>velox</i> . |
| Palpi with slight projection or short tuft only..... | 2. |
| 2. Forewings with distinct white costal streak from base | 3. |
| Forewings without such streak..... | 6. |
| 3. Discal stigmata black..... | 4. |
| Discal stigmata absent..... | 20. <i>hypoxutha</i> . |
| 4. Forewings yellowish..... | 5. |
| Forewings whitish-fuscous..... | 17. <i>astathma</i> . |
| 5. Forewings with white dorsal streak..... | 21. <i>eustola</i> . |
| Forewings without white dorsal streak..... | 22. <i>trimeris</i> . |
| 6. Forewings with distinct white costal spot at $\frac{3}{4}$ | 24. <i>plagiocentra</i> . |
| Forewings without such spot..... | 7. |
| 7. Scale-projection of palpi tuft-like..... | 8. |
| Scale-projection of palpi slight..... | 9. |
| 8. Palpi with blackish rings..... | 7. <i>mylephata</i> . |
| Palpi without blackish rings..... | 19. <i>liopis</i> . |
| 9. Head ochreous-yellow..... | 23. <i>epixantha</i> . |
| Head not yellow..... | 10. |
| 10. Head fuscous or dark grey..... | 11. |
| Head white or whitish-ochreous..... | 12. |
| 11. Forewings irrorated with white..... | 15. <i>phoreydia</i> . |
| Forewings not irrorated with white..... | 10. <i>ditrota</i> . |
| 12. Palpi with distinct blackish rings..... | 13. |
| Palpi without blackish rings..... | 20. |
| 13. Second joint of palpi with black apical ring only.. | 3. <i>arenosella</i> . |
| Second joint of palpi with two black rings..... | 14. |
| 14. Second joint of palpi with apical black ring..... | 11. <i>diplosema</i> . |
| Second joint of palpi without apical black ring... | 15. |
| 15. Terminal joint of palpi with apex black..... | 16. |
| Terminal joint of palpi with apex not black..... | 18. |

- | | |
|---|-------------------------|
| 16. Terminal joint of palpi with base black.... | 17. |
| Terminal joint of palpi with base not black..... | 13. <i>hypachroa</i> . |
| 17. Forewings pale ochreous..... | 4. <i>metazicus</i> . |
| Forewings grey..... | 8. <i>eremochtha</i> . |
| 18. Forewings with distinct black apical dot..... | 9. <i>helarcha</i> . |
| Forewings without such dot..... | 19. |
| 19. Groundcolour of forewings pale ochreous..... | 5. <i>microtoma</i> . |
| Groundcolour of forewings whitish..... | 6. <i>sterilis</i> . |
| 20. Palpi wholly ochreous-white..... | 12. <i>holochlora</i> . |
| Palpi not wholly whitish..... | 21. |
| 21. Cilia of forewings white..... | 16. <i>leucophyta</i> . |
| Cilia of forewings whitish-fuscos..... | 22. |
| 22. Groundcolour of forewings whitish-ochreous..... | 18. <i>megalodoxa</i> . |
| Groundcolour of forewings pale fuscos..... | 14. <i>volucris</i> . |

2. *B. velox*, n.sp.

♀. 12 mm. Head white, crown grey behind. Palpi white, tuft large, mixed with dark fuscous. Antennæ dark fuscous. Thorax fuscous, shoulders white. Abdomen grey. Legs dark fuscous, posterior tarsi whitish-ringed. Forewings fuscous; costal edge white from base to $\frac{2}{3}$; a rather thick white supramedian streak from costa at base to apex of wing, confluent with costal edge to $\frac{1}{4}$, otherwise margined with black to $\frac{3}{4}$, beyond this indistinct and ill-defined; an elongate-oval black apical dot, and a short black subapical dash: cilia whitish-fuscous, above apex mixed with dark fuscous and with a dark fuscous subbasal line. Hindwings grey; cilia whitish-grey.

Albany, West Australia; in October, one specimen.

3. *B. arenosella*, Walk.

(*Gracilaria arenosella*, Walk. Tin. 857; *Batrachedra arenosella*, Meyr., Trans. N.Z. Inst. 1888, 181.)

♂♀. 10-15 mm. Head, thorax, and abdomen pale ochreous, sometimes whitish-tinged. Palpi ochreous-whitish, apex of second joint and subbasal and subapical rings of terminal black, scale-projection very slight. Antennæ whitish-ochreous, indistinctly fuscous-ringed, towards apex with two or three darker fuscous bands. Legs whitish-ochreous, spotted with dark fuscous.

Forewings light ochreous, thinly sprinkled with dark fuscous, more thickly towards costa posteriorly; plical stigma linear, second discal dotlike, black: cilia above apex whitish-ochreous, beneath light grey. Hindwings grey; cilia light grey.

Brisbane, Queensland; Sydney and Mittagong (3000 feet), New South Wales; Deloraine and Mount Wellington, Tasmania; Adelaide, Wirrabara, and Port Lincoln, South Australia; common also in New Zealand; September to March, thirty-six specimens. Larva amongst seeds of *Juncus*, joining them together with a slight web, in August (and doubtless most of the summer). Pupa very slender, in a cocoon amongst the seeds. A common species, probably very generally distributed in suitable localities.

4. *B. metaxias*, n.sp.

♂. 14 mm. Head ochreous-white. Palpi whitish, subbasal and subapical bands on second joint, and base and apex of terminal black, scale-projection very slight. Antennæ as in *B. arenosella*, but suffused with fuscous above. Thorax and abdomen whitish-ochreous. Legs dark fuscous, posterior tibiæ sprinkled with whitish-ochreous, apex of tarsal joints whitish-ochreous. Forewings pale ochreous; broad costal and dorsal streaks throughout fuscous-tinged and irrorated with black: cilia above apex whitish-ochreous, beneath whitish-fuscous. Hindwings grey; cilia whitish-fuscous.

Mt. Wellington, Tasmania; in December, one specimen.

5. *B. microtoma*, n.sp.

♀. 11 mm. Head ochreous-whitish. Palpi whitish, median and subapical bands on second joint, and median band on terminal black, scale-projection very slight. Antennæ ochreous-whitish, suffusedly ringed with dark fuscous. Thorax and abdomen pale ochreous. Legs dark fuscous, tibiæ and tarsi ringed with whitish-ochreous. Forewings pale ochreous, deeper and yellower on a discal streak from $\frac{1}{3}$ to $\frac{2}{3}$, irregularly irrorated with black except on discal streak; a broad dark fuscous dorsal streak from base to near apex; plical stigma elongate, second discal oval, black, resting

on dorsal streak: cilia pale fuscous. Hindwings broader than in *B. arenosella*, grey; cilia pale fuscous.

Sydney, New South Wales; in September, one specimen.

6. *B. sterilis*, n.sp.

♂♀. 10-14 mm. Head ochreous-white. Palpi white, median and subapical bands on second joint and sometimes a median ring on terminal black, scale-projection distinct. Antennae whitish-ochreous, ringed with dark fuscous. Thorax ochreous-whitish, sprinkled with dark fuscous. Abdomen grey-whitish. Legs ochreous-whitish, banded with dark fuscous. Forewings whitish, irrorated with dark fuscous, more densely toward dorsum; plical stigma linear, first discal seldom defined, second dot-like, sometimes connected with first by a slender streak, and two oblique costal strigulae before apex blackish, all sometimes partially obsolete or obscured by the dark irroration: cilia above apex whitish with a blackish median line, beneath whitish-fuscous. Hindwings grey; cilia whitish-fuscous.

Sydney, New South Wales; Mount Macedon, Victoria; Launceston and Hobart, Tasmania; September to February, twenty-two specimens.

7. *B. mylephata*, n.sp.

♂. 13-14 mm. Head white. Palpi white, basal, median, and subapical bands of second joint, and median ring of terminal blackish, scale-projection tuft-like, nearly as long as terminal joint. Antennae white, fuscous-ringed. Thorax white, sometimes fuscous-sprinkled. Abdomen whitish. Legs whitish, spotted with dark fuscous. Forewings white, irrorated with fuscous and dark fuscous; plical stigma linear, first and second discal rather elongate or dot-like, blackish: cilia above apex whitish with a dark fuscous median line, beneath whitish-fuscous. Hindwings grey; cilia whitish-fuscous.

Brisbane, Queensland; in September, two specimens.

8. *B. eremochtha*, n.sp.

♂. 9 mm. Head whitish, crown greyish-tinged. Palpi white, subbasal and subapical rings of second joint, and basal and apical

rings of terminal black, scale-projection very slight. Antennæ whitish, fuscous-ringed, towards apex with three darker bands. Thorax and abdomen light grey, whitish-sprinkled. Legs dark grey, tarsi whitish-ringed. Forewings grey; an ill-defined whitish longitudinal streak in disc from about middle to near apex; plical stigma minute, black: cilia on costa grey, at apex ochreous-white with a black subbasal mark, beneath whitish-fuscous. Hindwings grey; cilia whitish-fuscous.

Albany, West Australia; in October, one specimen.

9. *B. helarcha*, n.sp.

♂♀. 8-12 mm. Head white, crown usually pale greyish-ochreous posteriorly. Palpi whitish, subbasal and subapical rings of second and terminal joints blackish, scale-projection very slight. Antennæ whitish, obscurely ringed and sometimes suffused with fuscous. Thorax and abdomen white, sprinkled with pale grey. Legs whitish, ringed with pale fuscous. Forewings pale greyish-ochreous, sprinkled with fuscous; veins more or less obscurely and variably streaked with whitish and sprinkled with black; first and second discal stigmata linear, black; a black apical dot: cilia on costa ochreous-whitish, at apex fuscous, beneath whitish-fuscous. Hindwings grey; cilia whitish-fuscous.

Brisbane, Queensland; Sydney, New South Wales; Deloraine and Georges Bay, Tasmania; from September to January, amongst *Juncus* in swampy places, fourteen specimens.

10. *B. ditrota*, n.sp.

♂♀. 13-15 mm. Head, antennæ, thorax, and abdomen fuscous. Palpi whitish-fuscous, apical ring of second joint and five rings of terminal black, scale-projection very slight. Legs dark fuscous, sprinkled with ochreous-whitish. Forewings fuscous, irrorated with dark fuscous; first and sometimes second discal stigma round, black; a black apical dot: cilia fuscous. Hindwings and cilia fuscous.

Launceston and Deloraine, Tasmania; in November and December, three specimens.

11. *B. diplosema*, n.sp.

♂♀. 7-8 mm. Head and thorax ochreous, face whitish. Palpi whitish, subapical and apical rings of second joint and median band of terminal black, scale-projection very slight. Antennæ whitish, suffusedly ringed with dark fuscous. Abdomen grey, sides white. Legs fuscous, sprinkled with white and ringed with black. Forewings brownish-ochreous, irrorated with dark fuscous; first and second discal stigmata round, black: cilia light fuscous. Hindwings grey; cilia light fuscous.

Brisbane, Queensland; in September, two specimens.

12. *B. holochlora*, n.sp.

♀. 16 mm. Head, palpi, antennæ, thorax, abdomen, and legs ochreous-white; scale-projection of palpi very slight. Forewings ochreous-whitish, somewhat sprinkled suffusedly with ochreous; first and second discal stigmata round, dark fuscous; a minute dark fuscous apical dot: cilia whitish. Hindwings grey-whitish; cilia ochreous-whitish.

Sydney, New South Wales; in December, one specimen.

13. *B. hypachroa*, n.sp.

♂♀. 11-12 mm. Head whitish-ochreous. Palpi whitish, median and subapical rings of second joint, and submedian and apical rings of terminal black, scale-projection slight. Antennæ ochreous-whitish, ringed with dark fuscous. Thorax pale ochreous, sprinkled with black. Abdomen grey-whitish. Legs whitish, ringed with dark fuscous. Forewings pale ochreous, rather thickly sprinkled with black; plical and first and second discal stigmata elongate, black: cilia on costa whitish-ochreous sprinkled with black, rest ochreous-whitish. Hindwings and cilia grey-whitish.

Glen Innes (3000 feet), New South Wales; Mount Gambier, South Australia; in November and December, two specimens.

14. *B. volucris*, n.sp.

♂♀. 14-15 mm. Head, thorax, and abdomen whitish-fuscous. Palpi whitish-fuscous, irrorated with dark fuscous, scale-projection

distinct. Antennæ whitish-fuscous, indistinctly darker-ringed. Legs dark fuscous, irrorated and ringed with whitish-fuscous. Forewings light fuscous, sprinkled with dark fuscous, and with a few whitish scales; plical and first and second discal stigmata small, blackish; a blackish apical dot: cilia whitish-fuscous. Hindwings light grey; cilia whitish-fuscous.

Sydney, New South Wales; in October and March, two specimens.

15. *B. phorcydia*, n.sp.

♂. 11 mm. Head, palpi, antennæ, thorax, abdomen, and legs dark grey, finely irrorated with white; scale-projection of palpi very slight. Forewings dark grey, finely irrorated with white; a black median basal dot; first discal stigma elongate, blackish: cilia light grey, irrorated with whitish. Hindwings grey; cilia light grey.

Geraldton, West Australia; in November, one specimen.

16. *B. leucophyta*, n.sp.

♂. 9 mm. Head, thorax, and abdomen grey-whitish. Palpi dark fuscous, beneath whitish, scale-projection very slight. Antennæ whitish, ringed with dark fuscous. Legs white, banded with dark fuscous. Forewings white, coarsely irrorated with dark grey: cilia white. Hindwings whitish-grey; cilia white.

Carnarvon, West Australia; in October, one specimen.

17. *B. astathma*, n.sp.

♂♀. 7-9 mm. Head, thorax, and abdomen white. Palpi white, submedian and subapical rings of second joint, and basal and subapical rings of terminal black, scale-projection slight. Antennæ whitish, suffused with fuscous above. Legs whitish, ringed with fuscous. Forewings fuscous, suffusedly irrorated with white, with scattered black scales; a suffused white costal streak from base to $\frac{2}{3}$; plical and first and second discal stigmata rather large, black; a black apical dot: cilia fuscous-whitish. Hindwings and cilia grey-whitish.

Sydney, New South Wales; in September, February, and March, five specimens.

18. *B. megalodoxa*, n.sp.

♂♀. 16-17 mm. Head whitish-ochreous. Palpi dark fuscous, irrorated with whitish-ochreous, terminal joint with pale basal band, scale-projection slight. Antennæ whitish-ochreous, indistinctly ringed with dark fuscous. Thorax whitish-ochreous irrorated with fuscous. Abdomen whitish-ochreous. Legs dark fuscous, irrorated with whitish-ochreous. Forewings whitish-ochreous irrorated with fuscous or dark fuscous, posterior third of costa and termen spotted with pale and dark; plical and second discal stigmata elongate, black: cilia pale fuscous. Hindwings pale grey irrorated with dark grey; cilia pale fuscous.

Rosewood, Queensland; in September, two specimens.

19. *B. liopis*, n.sp.

♀. 15-17 mm. Head, palpi, antennæ, thorax, abdomen, and legs whitish-ochreous, brownish-tinged; scale-projection of palpi forming a short tuft. Forewings whitish-ochreous suffused with pale brownish, more strongly towards apex; costal edge suffused with white from middle to $\frac{2}{3}$; plical and first and second discal stigmata small, black: cilia on costa white, round apex and beneath pale fuscous. Hindwings and cilia light grey.

Sydney, New South Wales, in March; Campbelltown, Tasmania; in December, two specimens.

20. *B. hypoxutha*, n.sp.

♀. 11-12 mm. Head, thorax, and abdomen whitish-ochreous. Palpi white, second joint with very oblique ochreous or fuscous subapical band, scale-projection slight. Antennæ white, ringed with brown. Legs dark fuscous, suffusedly banded with whitish. Forewings yellow-brown; costal edge suffusedly white: cilia light brownish. Hindwings grey; cilia light brownish.

Brisbane and Rosewood, Queensland; Sydney, New South Wales; in September and December, three specimens.

21. *B. eustola*, n.sp.

♂. 11 mm. Head white. Palpi with second joint fuscous, apex white, terminal joint short, dark fuscous, apex white, scale-

projection rather short, loose. Antennæ whitish. Thorax ochreous-yellowish, with two white stripes. Abdomen grey-whitish. Legs dark fuscous, posterior pair whitish. Forewings deep yellow; costal, submedian, and dorsal streaks silvery-white; first and second discal stigmata black: cilia whitish. Hindwings pale grey; cilia whitish.

Sydney, New South Wales; in September, one specimen.

22. *B. trimeris*, n.sp.

♀. 9-12 mm. Head white, crown partly ochreous-tinged. Palpi with second joint fuscous, apex white, terminal joint white, apex black, scale-projection short. Antennæ pale grey. Thorax ochreous, with two white stripes. Abdomen whitish-grey. Legs dark fuscous, posterior pair whitish. Forewings golden-yellow-ochreous; a broad shining white costal streak from base to apex, costal edge dark fuscous; sometimes an ill-defined whitish submedian longitudinal streak; first and second discal stigmata black: cilia light grey, on costa dark grey. Hindwings dark grey; cilia light grey.

Perth, West Australia; in October, two specimens.

23. *B. epixantha*, n.sp.

♂♀. 9-11 mm. Head ochreous-yellow. Palpi yellowish, terminal joint dark fuscous, scale-projection very slight. Antennæ grey, ringed with black. Thorax ochreous-yellow, sometimes suffused with fuscous. Abdomen grey. Legs dark fuscous, posterior pair ochreous-whitish. Forewings deep ochreous-yellow, costal half suffused with rather dark fuscous except towards costa posteriorly; plical and second discal stigmata black: cilia fuscous, darker round apex. Hindwings dark grey; cilia grey.

Sydney, New South Wales; Albany, West Australia; in September, October, and March, five specimens.

24. *B. plagiocentra*, n.sp.

♂♀. 11-15 mm. Head ochreous-white. Palpi fuscous irrorated with black, terminal joint and apex of second white, scale-

projection short. Antennæ grey. Thorax ochreous-whitish, sides pale brownish. Abdomen grey-whitish. Legs dark fuscous, suffusedly whitish-ringed, middle and posterior tibiæ suffused with white. Forewings rather dark fuscous, irrorated or much suffused with ochreous-whitish; plical, first and second discal stigmata, and an apical dot black; a white costal spot at $\frac{3}{4}$; cilia light fuscous, darker and sometimes spotted with white on costa, round apex with a dark fuscous line at tips. Hindwings grey; cilia light fuscous.

Sydney, New South Wales; Georges Bay, Tasmania; Geraldton, West Australia; in September, November, and January, four specimens.

3. HAPLOCHROIS, n.g.

Antennæ $\frac{4}{5}$, in ♂ shortly ciliated. Labial palpi long, recurved, smooth-scaled, terminal joint much shorter than second, acute. Posterior tibiæ rough-haired. Forewings: 1b furcate (?), 5 sometimes out of 7 near base, 6 out of 7, 7 to costa, 8 out of 7. Hindwings $\frac{2}{3}$, elongate-lanceolate, cilia 4; 6 and 7 stalked.

Type *H. chlorometalla*. At present confined to the two following species, which seem to have collateral relationship with the earlier forms of *Batrachedra*. Imago with forewings elongate-lanceolate.

Forewings with white costal streak.....	25. <i>chlorometalla</i> .
Forewings without such streak.....	26. <i>thalycra</i> .

25. *H. chlorometalla*, n.sp.

♂♀. 12-13 mm. Head whitish-ochreous, brownish-sprinkled. Palpi white, terminal joint and apex of second black. Antennæ grey, darker-ringed. Thorax light bronzy-ochreous. Abdomen ochreous-whitish. Legs dark fuscous, middle and posterior tibiæ suffused with white. Forewings shining bronzy-ochreous, sometimes fuscous-tinged; a white costal streak from before middle to near apex: cilia pale fuscous, on costa white. Hindwings grey; cilia pale fuscous.

Sydney, New South Wales; in September and November, two specimens.

26. *H. thalyera*, n.sp.

♀. 12 mm. Head and thorax light reddish-ochreous. Palpi pale reddish-ochreous, terminal joint dark fuscous. Antennæ grey, darker-ringed. Abdomen dark grey. Legs dark grey, posterior pair pale ochreous. Forewings reddish-ochreous, costal half suffused with fuscous except towards costa posteriorly; second discal stigma dark fuscous: cilia grey, on costa and round apex pale reddish-ochreous. Hindwings dark grey; cilia grey.

Sydney, New South Wales; in October, one specimen.

4. RHADINASTIS, n.g.

Antennæ 1, in ♂ shortly ciliated. Labial palpi rather long, recurved, smooth-scaled, terminal joint shorter than second, acute. Posterior tibiæ rough-haired. Forewings: 1b furcate, 6 and 7 out of 8, 7 to costa. Hindwings $\frac{1}{2}$, linear-lanceolate, cilia 6; 6 and 7 stalked.

Type *R. microlychna*. Contains only the two following species; its affinities are not very pronounced, but it seems related to *Batrachedra*, though earlier in development. Imago with forewings elongate, narrow, long-pointed. The known larva is a true gall-producer.

Hindwings partly yellow..... 27. *microlychna*.
Hindwings wholly dark grey..... 28. *sideropa*.

27. *R. microlychna*, n.sp.

♂. 10-12 mm. Head, palpi, antennæ, thorax, abdomen, and legs dark fuscous, finely pale-sprinkled. Forewings dark fuscous, purplish-tinged, finely sprinkled with light ochreous-grey: cilia fuscous, round apex darker and pale-sprinkled. Hindwings dark fuscous; basal $\frac{2}{5}$ more or less wholly ochreous-yellow; cilia fuscous.

Sydney, New South Wales; Wirrabara, South Australia; in November and December, two specimens. Larva 16-legged, moderate, cylindrical, with scattered whitish hairs; smoky-grey, with a row of large raised black spots on each side of back, two on each segment; a spiracular row of obliquely elongate black spots,

and a subspiracular row of similar spots obliquely behind these; head pale dull ochreous; second and anal segments almost entirely blackish from confluence of spots: feeds in galls on *Acacia linifolia* in August; gall half-an-inch long, irregularly elongate-cylindrical, narrowed at ends, situated on a pedicel of equal length, and probably representing a metamorphosed flowerhead.

28. *R. sideropa*, n.sp.

♂. 10-13 mm. Head, palpi, antennae, thorax, abdomen, and legs dark ashy-fuscous. Forewings dark ashy-fuscous, violet-tinged: cilia fuscous. Hindwings dark grey; cilia grey.

Deloraine, Tasmania; York, West Australia; in November, two specimens.

5. *PACHYRHABDA*, n.g.

Antennae $\frac{5}{6}$, in ♂ thick, compressed, simple. Labial palpi long, recurved, smooth, terminal joint as long as second, acute. Posterior tibiae rough-haired, posterior tarsi with whorls of hairs at joints. Forewings: 1b simple, 2 partly obsolete, 7 and 8 stalked; 7 to costa. Hindwings $\frac{1}{2}$, linear, cilia 8; transverse vein absent between 3 and 5, 4 absent, 6 absent.

A monotypic genus, originating from *Stathmopoda*. Imago with forewings elongate, very narrow, broadest near base, long-pointed; in repose the posterior legs are erected as in *Stathmopoda*.

29. *P. steropodes*, n.sp.

♂♀. 9-10 mm. Head, palpi, antennae, thorax, and abdomen ochreous-whitish. Legs whitish, obscurely spotted with dark grey. Forewings ochreous-whitish; two very faint ill-defined light ochreous-brownish spots on dorsum near base and in middle, one on tornus, and two on costa at $\frac{1}{2}$ and $\frac{3}{4}$, sometimes partially suffused together or hardly traceable: cilia ochreous-whitish. Hindwings grey or whitish-grey; cilia whitish.

Warragul, Victoria; Mount Wellington (2500 feet), Tasmania; in September and December, six specimens.

6. *CALICOTIS*, Meyr.

Antennæ $\frac{3}{4}$, in ♂ rather stout, basal joint dilated and concave to form an eyecap. Labial palpi long, recurved, second joint smooth-scaled, terminal shorter, acute. Posterior tibiae densely rough-haired, posterior tarsi with whorls of long spines at apex of joints. Forewings: 1b simple, 2 and 3 absent, 7 and 8 stalked, 7 to costa. Hindwings $\frac{1}{2}$, linear, cilia 7; 4 absent, transverse vein absent between 3 and 6.

Also monotypic and derived from *Stathmopoda*, with collateral relationship to the preceding. Imago with forewings elongate, very narrow, broadest near base, long-pointed; in repose the posterior legs are bent so as to form an angular arch, and extended horizontally at right angles to the body. Larva feeding on ferns.

30. *C. crucifera*, Meyr.

(*Calicotis crucifera*, Meyr., Trans. N. Zeal. Inst. 1888, 170.)

♂♀. 9-12 mm. Head, antennæ, thorax, and abdomen ochreous-whitish (substance of abdomen ferruginous-ochreous). Palpi white, terminal joint with a black lateral longitudinal line. Legs whitish, anterior pair striped with blackish, middle and posterior tarsi spotted with blackish. Forewings whitish, more or less irregularly and variably suffused or blotched with ochreous; a small cloudy dark fuscous dorsal spot near base, and another on costa before middle, both in ♀ sometimes almost obsolete; an apical black dot: cilia ochreous-whitish. Hindwings pale grey; cilia ochreous-whitish.

Sydney, New South Wales; only observed in the Botanical Gardens, where it must of course have been introduced with its foodplant, but occurs in abundance from November to May; it is plentiful and undoubtedly native in the forests of the North Island of New Zealand; but it may turn out to be indigenous in Australia also, as the foodplant is considered native in both countries. Larva 16-legged, moderately stout, cylindrical, active; whitish flesh-colour, or whitish; head pale whitish-brown: feeds on the large parasitic fern *Platyserium grande*, burrowing amongst

and a subspiracular row of similar spots obliquely behind these; head pale dull ochreous; second and anal segments almost entirely blackish from confluence of spots: feeds in galls on *Acacia linifolia* in August; gall half-an-inch long, irregularly elongate-cylindrical, narrowed at ends, situated on a pedicel of equal length, and probably representing a metamorphosed flowerhead.

28. *R. sideropa*, n.sp.

♂. 10-13 mm. Head, palpi, antennæ, thorax, abdomen, and legs dark ashy-fuscous. Forewings dark ashy-fuscous, violet-tinged: cilia fuscous. Hindwings dark grey; cilia grey.

Deloraine, Tasmania; York, West Australia; in November, two specimens.

5. *PACHYRHABDA*, n.g.

Antennæ $\frac{5}{8}$, in ♂ thick, compressed, simple. Labial palpi long, recurved, smooth, terminal joint as long as second, acute. Posterior tibiæ rough-haired, posterior tarsi with whorls of hairs at joints. Forewings: 1b simple, 2 partly obsolete, 7 and 8 stalked, 7 to costa. Hindwings $\frac{1}{2}$, linear, cilia 8; transverse vein absent between 3 and 5, 4 absent, 6 absent.

A monotypic genus, originating from *Stathmopoda*. Imago with forewings elongate, very narrow, broadest near base, long-pointed; in repose the posterior legs are erected as in *Stathmopoda*.

29. *P. steropodes*, n.sp.

♂♀. 9-10 mm. Head, palpi, antennæ, thorax, and abdomen ochreous-whitish. Legs whitish, obscurely spotted with dark grey. Forewings ochreous-whitish; two very faint ill-defined light ochreous-brownish spots on dorsum near base and in middle, one on tornus, and two on costa at $\frac{1}{2}$ and $\frac{3}{4}$, sometimes partially suffused together or hardly traceable: cilia ochreous-whitish. Hindwings grey or whitish-grey; cilia whitish.

Warragul, Victoria; Mount Wellington (2500 feet), Tasmania; in September and December, six specimens.

6. CALICOTIS, Meyr.

Antennæ $\frac{3}{4}$, in ♂ rather stout, basal joint dilated and concave to form an eyecap. Labial palpi long, recurved, second joint smooth-scaled, terminal shorter, acute. Posterior tibiae densely rough-haired, posterior tarsi with whorls of long spines at apex of joints. Forewings: 1b simple, 2 and 3 absent, 7 and 8 stalked, 7 to costa. Hindwings $\frac{1}{2}$, linear, cilia 7; 4 absent, transverse vein absent between 3 and 6.

Also monotypic and derived from *Stathmopoda*, with collateral relationship to the preceding. Imago with forewings elongate, very narrow, broadest near base, long-pointed; in repose the posterior legs are bent so as to form an angular arch, and extended horizontally at right angles to the body. Larva feeding on ferns.

30. *C. crucifera*, Meyr.

(*Calicotis crucifera*, Meyr., Trans. N. Zeal. Inst. 1888, 170.)

♂♀. 9-12 mm. Head, antennæ, thorax, and abdomen ochreous-whitish (substance of abdomen ferruginous-ochreous). Palpi white, terminal joint with a black lateral longitudinal line. Legs whitish, anterior pair striped with blackish, middle and posterior tarsi spotted with blackish. Forewings whitish, more or less irregularly and variably suffused or blotched with ochreous; a small cloudy dark fuscous dorsal spot near base, and another on costa before middle, both in ♀ sometimes almost obsolete; an apical black dot: cilia ochreous-whitish. Hindwings pale grey; cilia ochreous-whitish.

Sydney, New South Wales; only observed in the Botanical Gardens, where it must of course have been introduced with its foodplant, but occurs in abundance from November to May; it is plentiful and undoubtedly native in the forests of the North Island of New Zealand; but it may turn out to be indigenous in Australia also, as the foodplant is considered native in both countries. Larva 16-legged, moderately stout, cylindrical, active; whitish flesh-colour, or whitish; head pale whitish-brown: feeds on the large parasitic fern *Platyserium grande*, burrowing amongst

the ripe fructification beneath the fronds, forming galleries of loose refuse, in March (and doubtless at other seasons).

7. CUPHODES, n.g.

Characters of *Stathmopoda*, but antennæ 1, in ♂—(?); middle and posterior tibiæ and tarsi clothed with bristly hairs.

Also an offshoot of *Stathmopoda*, perhaps with some relationship to *Vanicela*. Imago with forewings very elongate, narrow, long-pointed.

31. *C. thysanota*, n.sp.

♀. 9 mm. Head, palpi, antennæ, thorax, and abdomen white. Legs white, tarsi and anterior tibiæ spotted with blackish. Forewings shining white; some fuscous scales towards dorsum before middle, and costa beyond middle; a narrow light fuscous blackish-edged terminal fascia from tornus to apex, anterior edge convex, attenuated to extremities, including a white terminal streak on upper half: cilia dark grey, on costa white, with a blackish hooked line round apex. Hindwings and cilia dark grey.

Rosewood, Queensland; in September, one specimen.

8. VANICELA, Walk.

Antennæ almost 1, in ♂ with very long ciliations (4), basal joint dilated and concave to form a large eyecap. Labial palpi long, recurved, second joint smooth-scaled, terminal as long as second, somewhat roughened anteriorly, acute. Anterior tibiæ and tarsi rather dilated with scales; posterior tibiæ and basal joint of tarsi clothed with bristly hairs above, outer middle-spur bristly above on basal half. Forewings: 1b furcate, 7 to costa, 7 and 8 approximated at base. Hindwings $\frac{1}{2}$, linear, cilia 6; veins all separate.

A genus of one Australian and one New Zealand species, belonging to the group of *Stathmopoda*, but so much specialised that its nearer affinities are difficult to trace. Imago with forewings elongate, very narrow, long-pointed; in repose the dilated anterior legs are extended in front, the posterior legs are not

erected but appressed to the abdomen, apparently without touching the surface on which the insect rests.

32. *Γ. xenadelpha*, Meyr.

(*Vanicela xenadelpha*, Meyr., Trans. N. Zeal. Inst. 1888, 166.)

♂♀. 12-15 mm. Head, palpi, and antennæ white. Thorax white, posterior half dark bronzy-fuscous. Legs white, base of tarsal joints obliquely streaked with dark fuscous. Forewings shining white, faintly yellowish-tinged; a dark bronzy-fuscous streak occupying dorsal half of wing, its upper margin not notched, cut in middle by a slender inwards-angulated white line reaching dorsum, and with a very minute projection at $\frac{3}{4}$; a white dorsal dot at $\frac{1}{4}$; a fine black longitudinal line in disc towards apex: cilia grey, with a black apical hook. Hindwings grey or dark grey; cilia grey.

Sydney, New South Wales; hitherto only on the fence of the Botanical Gardens, where it is common from September to December; it will probably be found native in Queensland. It differs constantly from the very similar New Zealand species by the white dorsal dot of forewings at $\frac{1}{4}$, the absence of the notch on dorsal streak, the junction of the central indentation and dot into an angulated line, and the minuteness of the projection at $\frac{3}{4}$.

9. *HIEROMANTIS*, n.g.

Characters of *Stathmopoda*, but basal joint of antennæ dilated and concave to form an eyecap.

A simple offshoot of *Stathmopoda*, with the same habits.

33. *H. ephodophora*, n.sp.

♂♀. 8-10 mm. Head and thorax pale bronzy-ochreous, face whitish. Palpi whitish, apex of joints sometimes obscurely dark-streaked. Antennæ whitish, more or less infuscated. Abdomen grey, sides brassy whitish. Legs whitish, spotted with dark fuscous. Forewings light yellow-ochreous; base of dorsum fuscous; a quadrate whitish dorsal spot at $\frac{1}{4}$, margined by a fuscous suffusion extending more or less broadly to costa; beyond

this an irregular elongate black submedian patch, containing a silvery-white anterior speck and two posterior subconfluent golden-metallic spots; a triangular whitish postmedian dorsal spot nearly reaching costa, edged with fuscous suffusion; an inwardly oblique whitish streak from costa before apex, not reaching dorsum, strongly fuscous-edged anteriorly; a fuscous streak along termen: cilia fuscous, on costa partly whitish. Hindwings dark fuscous; cilia fuscous.

Brisbane, Queensland; Sydney, New South Wales; in September and October, eight specimens.

10. STATHMOPODA, Staint.

Antennæ $\frac{3}{4}$, in ♂ with very long fine ciliations (4-5). Labial palpi very long, recurved, second joint smooth-scaled, terminal as long, acute. Posterior tibiae rough-haired. Forewings: 1b furcate, 2 and 3 sometimes partially obsolete, 7 and 8 stalked, 7 to costa. Hindwings $\frac{1}{2}$ - $\frac{3}{4}$, elongate-lanceolate, cilia 4-6; transverse vein absent between 5 and 6.

Numerously represented in Australia and New Zealand, but apparently little prominent in other regions, its distribution being similar to that of *Batrachedra*. Imago with forewings narrow, broadest near base, long-pointed; in repose the posterior legs are commonly erected more or less perpendicularly over the back, sometimes projecting between the anterior and middle pairs, the tarsi often bent more sideways, but in some species the insect does not always assume this posture, and sometimes does it with one leg only. The partial obsolescence of veins 2 and 3 is a variable character, appearing first at the base of the veins, sometimes the extreme tips only remaining. The labial palpi are usually more widely divergent than in other groups of the family. Although many of the species are plentiful, the larvæ have mostly eluded discovery; those known feed in galls or fruits, and probably many of the Australian species are attached to *Acacia*.

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|--|----|
| 1. Antennæ sharply ringed with dark fuscous.. .. . | 2. |
| Antennæ not sharply dark-ringed..... | 5. |

- | | | |
|--|-----|----------------------|
| 2. Forewings with white median longitudinal streak from base..... | 39. | <i>astrapeis</i> . |
| Forewings without such streak..... | 3. | |
| 3. Forewings with shining white costal streak..... | 55. | <i>canonica</i> . |
| Forewings without such streak | 4. | |
| 4. Costal cilia with dark anteapical patch..... | 53. | <i>megathyma</i> . |
| Costal cilia without such patch..... | 54. | <i>liporrhoea</i> . |
| 5. Forewings with three shining white dorsal spots.... | 34. | <i>triseleena</i> . |
| Forewings without such spots..... | 6. | |
| 6. Head metallic-grey..... | 7. | |
| Head not metallic-grey..... | 8. | |
| 7. Forewings with two dark fuscous fasciæ..... | 44. | <i>desmoteles</i> . |
| Forewings without such fasciæ..... | 37. | <i>cyanopla</i> . |
| 8. Forewings with dark basal fascia..... | 9. | |
| Forewings without such fascia..... | 10. | |
| 9. Groundcolour of forewings white..... | 42. | <i>pantarches</i> . |
| Groundcolour of forewings yellow..... | 52. | <i>callichrysa</i> . |
| 10. Forewings with metallic-grey or bronzy longitudinal discal streak..... | 11. | |
| Forewings without such streak | 17. | |
| 11. Forewings with continuous dark dorsal streak..... | 12. | |
| Forewings without such streak | 13. | |
| 12. Dorsal streak forming three distinct rounded lobes | 46. | <i>chalybeis</i> . |
| Dorsal streak not so formed..... | 47. | <i>iodes</i> . |
| 13. Forewings with dark dorsal spots..... | 14. | |
| Forewings without dark dorsal spots..... | 16. | |
| 14. Dorsal spots brown-reddish..... | 35. | <i>chalcotypa</i> . |
| Dorsal spots not brown-reddish... .. | 15. | |
| 15. Discal metallic streak running into tornal spot..... | 48. | <i>dorutias</i> . |
| Discal metallic streak not running into tornal spot | 36. | <i>acontias</i> . |
| 16. Forewings with grey costal streak..... | 41. | <i>hyposcia</i> . |
| Forewings without such streak..... | 40. | <i>mesombra</i> . |
| 17. Thorax with fuscous dorsal stripe | 18. | |
| Thorax without such stripe..... | 19. | |
| 18. Forewings fuscous with yellow spots..... | 49. | <i>xanthoma</i> . |
| Forewings whitish-ochreous with dark fuscous spots | 45. | <i>lethonea</i> . |
| 19. Forewings with dark fuscous postmedian costal blotch..... | 43. | <i>melanochra</i> . |
| Forewings without such blotch..... | 20. | |
| 20. Forewings with dark fuscous costal mark near base | 21. | |
| Forewings without such mark..... | 38. | <i>cephalaea</i> . |
| 21. Abdomen grey..... | 51. | <i>crocophanes</i> . |
| Abdomen whitish-ochreous..... | 50. | <i>ischnotis</i> . |

34. *S. triselenæ*, n.sp.

♂. 12-14 mm. Head silvery-white, collar dark fuscous. Palpi and antennæ pale ochreous. Thorax silvery-white, posteriorly ferruginous-ochreous edged with dark fuscous. Abdomen whitish, anal tuft whitish-ochreous. Legs whitish, ringed with dark fuscous. Forewings fuscous, on dorsum and towards apex suffused with ferruginous-brown; semicircular shining white dorsal spots at $\frac{1}{4}$, beyond middle, and at $\frac{4}{5}$, edged first with some ferruginous scales and then with dark fuscous: cilia fuscous. Hindwings dark grey, towards base thinly scaled; cilia fuscous.

Brisbane, Queensland; two specimens received from Dr. A. J. Turner.

35. *S. chalcotypa*, n.sp.

♂♀. 12-17 mm. Head and thorax pale reddish-ochreous; face and palpi whitish. Antennæ ochreous-whitish, more or less infuscated. Abdomen dark grey. Legs ochreous-whitish, anterior pair dark grey, posterior pair spotted with dark grey. Forewings yellow-ochreous; ill-defined dorsal spots towards base, before middle, and at $\frac{2}{3}$, and an irregular suffusion towards costa posteriorly and apex dull brown-reddish; a bronzy-metallic median streak from beneath base of costa to near middle of termen, edged with brown-reddish: cilia fuscous. Hindwings dark fuscous; cilia fuscous.

Sydney, New South Wales; Melbourne, Victoria; in September, October, and April, nine specimens. Mr. J. A. Kershaw has bred this species from galls on *Acacia decurrens*.

36. *S. acontias*, n.sp.

♂♀. 13-16 mm. Head, palpi, and antennæ whitish-ochreous. Thorax whitish-ochreous, seldom yellow-ochreous. Abdomen dark grey. Legs ochreous-whitish, anterior pair dark grey, posterior pair spotted with dark grey. Forewings pale whitish-ochreous, seldom yellow-ochreous; a median streak from beneath base of costa to beyond middle, a short basal subdorsal streak, a dorsal spot before middle, and a subdorsal spot at $\frac{2}{3}$ leaden-metallic,

partly edged with dark fuscous, variable in development; a variable sometimes obsolete dark fuscous subcostal streak beyond middle; a dark fuscous anteapical spot: cilia grey, on costa pale whitish-ochreous. Hindwings dark grey; cilia grey.

Fernshaw, Victoria; Launceston, Deloraine, and Hobart, Tasmania; in November and December, ten specimens.

37. *S. cyanopla*, n.sp.

♂♀. 10-13 mm. Head and thorax leaden-metallic, collar whitish-ochreous, sides of face ochreous-whitish. Palpi ochreous. whitish, terminal joint grey. Antennæ grey. Abdomen and legs dark grey. Forewings whitish-yellowish, sometimes stained with reddish near dorsum and apex; a strong median streak from beneath base of costa almost to tornus, thence near termen almost to apex, a thick streak along costa from middle to near apex, and a thick dorsal streak from base to near middle leaden-metallic, irregularly edged with dark grey: cilia dark grey. Hindwings and cilia dark grey.

Mount Kosciusko (5000 feet), New South Wales; Deloraine, Tasmania; from November to January, ten specimens.

38. *S. cephalaea*, n.sp.

♂♀. 17-20 mm. Head and thorax pale whitish-ochreous, tinged with brown-reddish. Palpi whitish, terminal joint reddish-tinged. Antennæ ochreous-whitish. Abdomen grey. Legs whitish, anterior pair grey, posterior pair grey-spotted. Forewings dull brown-reddish; a short streak below fold at $\frac{1}{2}$, a streak in middle of disc, and two spots towards apex ochreous-whitish, often ill-defined or partially obsolete; three blackish dots on fold, often merged in a dark grey streak, last terminated by some whitish dorsal scales; sometimes a grey discal spot at $\frac{3}{4}$: cilia light fuscous, on costa light reddish, tips whitish. Hindwings dark grey; cilia grey.

Hobart, Tasmania; from December to February, four specimens.

39. *S. astrapeis*, n.sp.

♀. 15 mm. Head and thorax dark bronzy-fuscous face pale shining grey. Palpi whitish, with a dark fuscous longitudinal lateral line. Antennæ whitish, ringed with dark fuscous. Abdomen grey. Legs dark grey, ringed with whitish. Forewings rather dark grey; an irregular ochreous-white median longitudinal streak from base almost to apex, irregularly edged with blackish suffusion, finely attenuated near base, interrupted at $\frac{3}{4}$: cilia fuscous, on costa grey with whitish tips. Hindwings and cilia fuscous.

Campbelltown, Tasmania; Adelaide, South Australia; in December, two specimens.

40. *S. mesombra*, n.sp.

♂. 15 mm. Head, palpi, antennæ, thorax, and abdomen whitish-ochreous. Legs ochreous-whitish, anterior pair dark fuscous, posterior pair spotted with dark fuscous. Forewings whitish-ochreous; three longitudinal leaden-metallic streaks confluent towards base, first subcostal, reaching $\frac{5}{6}$, second median, running to middle of termen and thence to apex, third along fold, suffused with blackish anteriorly; a line of black scales in disc posteriorly: cilia pale fuscous. Hindwings grey; cilia pale fuscous.

Hobart, Tasmania; in December, one specimen.

41. *S. hyposcia*, n.sp.

♂♀. 11-15 mm. Head, palpi, antennæ, and thorax whitish-ochreous. Abdomen grey. Legs ochreous-whitish, anterior pair dark fuscous, posterior pair spotted with dark fuscous. Forewings whitish-ochreous; a costal streak from before middle to $\frac{3}{4}$, an elongate subcostal mark near base, another at $\frac{1}{4}$, a streak from middle of disc to near termen before apex, and a short subdorsal streak near base pale leaden-metallic; plical stigma elongate, dark fuscous, submetallic, sometimes connected with dorsum; second discal stigma indicated by a projection of discal streak: cilia light fuscous. Hindwings rather dark grey; cilia light fuscous.

Sydney and Bathurst, New South Wales; Hobart, Tasmania; Albany, West Australia; from August to December, twenty specimens.

42. *S. pantarches*, n.sp.

♂♀. 16-18mm. Head white. Palpi whitish-ochreous. Antennæ whitish-ochreous, indistinctly fuscous-ringed. Thorax dark brown, with a quadrate white anterior spot. Abdomen in ♂ ochreous-yellow ringed with dark fuscous, in ♀ pale greyish-ochreous ringed with dark grey. Legs whitish, anterior and posterior pairs ringed with dark fuscous. Forewings white; a rather narrow dark fuscous basal fascia; costal edge dark fuscous to beyond middle; irregular rather narrow dark ferruginous-brown fasciæ at $\frac{1}{3}$ and $\frac{2}{3}$, space between them suffused with ferruginous except on a median spot, second fascia extended along costa to apex: cilia ferruginous-fuscous, on costa and round apex dark fuscous. Hindwings dark fuscous; cilia ferruginous-fuscous.

Sydney, New South Wales; Melbourne, Victoria; in November, two specimens.

43. *S. melanochnra*, n.sp.

♂♀. 12-17 mm. Head, antennæ, and thorax shining whitish-ochreous, crown tinged with metallic grey. Palpi ochreous-whitish. Abdomen grey. Legs ochreous-whitish, banded with dark fuscous. Forewings whitish-ochreous, with metallic reflections; markings rather dark fuscous, suffusedly edged with blackish; a dorsal spot at $\frac{1}{4}$, and a subdorsal spot rather beyond and sometimes connected with this; a semi-oval sometimes partly ferruginous-tinged median dorsal blotch, and a round discal spot above and more or less confluent with it; a semi-oval costal blotch at $\frac{2}{3}$, and an elongate subdorsal spot beneath it; an irregular almost apical spot: cilia fuscous. Hindwings dark fuscous; cilia fuscous.

Sydney, Blackheath (3500 feet), Bathurst, and Glen Innes (3500 feet), New South Wales; Melbourne and Casterton, Victoria; Launceston, Deloraine, Campbelltown, and Hobart, Tas-

mania; Mount Lofty (2000 feet), Mount Gambier, and Victor Harbour, South Australia; from May to February, very common.

44. *S. desmoteles*, n.sp.

♀. 8 mm. Head whitish-grey, collar whitish-ochreous. Palpi ochreous-whitish. Antennæ grey. Thorax whitish-ochreous. Abdomen grey. Legs dark fuscous, posterior pair banded with ochreous-whitish. Forewings shining whitish-ochreous; costa narrowly dark fuscous from base to middle; a moderate irregular-edged vertical dark fuscous fascia before middle, and another at $\frac{2}{3}$, connected on dorsum; costal and terminal margins beyond second fascia dark fuscous, more strongly at apex: cilia fuscous, on costa dark fuscous. Hindwings dark fuscous; cilia fuscous.

Bathurst (2000 feet), New South Wales; in November, one specimen.

45. *S. lethonoa*, n.sp.

♂♀. 10-14 mm. Head, palpi, antennæ, and thorax whitish-ochreous; thorax with a fuscous dorsal stripe. Abdomen grey. Legs ochreous-whitish, suffusedly banded with dark grey. Forewings whitish-ochreous or ochreous-yellow; markings rather dark fuscous, partially darker-edged; a triangular dorsal spot near base; semi-oval dorsal spots at $\frac{1}{2}$ and $\frac{3}{4}$, sometimes connected on dorsum; a costal streak from $\frac{1}{3}$ almost to apex, attenuated anteriorly: cilia fuscous. Hindwings dark fuscous; cilia fuscous.

Sydney, New South Wales; Melbourne, Victoria; Hobart, Tasmania; from April to December, very common.

46. *S. chalybeis*, n.sp.

♂♀. 10-14 mm. Head, palpi, and antennæ shining whitish-ochreous, collar yellow-ochreous. Thorax yellow-ochreous, with a fuscous dorsal stripe. Abdomen dark grey. Legs whitish-ochreous, suffused above with dark grey. Forewings whitish-ochreous, sometimes tinged with reddish or yellowish; markings fuscous, partially darker-edged; a dorsal streak from base to tornus, upper edge sinuate so as to form three rounded lobes,

third sometimes produced into a short fine streak towards apex; a costal streak from base to apex, attenuated anteriorly, on basal $\frac{1}{4}$ only occupying extreme edge; a pale leaden-metallic discal streak from beneath base of costa to third lobe of dorsal streak: cilia fuscous. Hindwings dark fuscous; cilia fuscous.

Hobart, Tasmania; Port Lincoln, South Australia; Albany, West Australia; from September to December, eight specimens.

47. *S. iodes*, n.sp.

♂♀. 11-12 mm. Head, palpi, and antennæ shining ochreous-whitish. Thorax ferruginous, with a leaden-metallic dorsal stripe. Abdomen grey. Legs shining whitish, suffused above with dark grey. Forewings ferruginous; markings shining submetallic leaden-grey; costal edge grey; a discal streak from beneath base of costa to termen, posteriorly suffused and indistinct; a suffused dorsal streak from base to tornus, sometimes extending to submedian fold: cilia grey. Hindwings and cilia grey.

Sydney, New South Wales; Fernshaw, Victoria; Deloraine, Tasmania; from August to December, thirteen specimens.

48. *S. doratias*, n.sp.

♂♀. 11-12 mm. Head, palpi, and antennæ shining ochreous-whitish. Thorax light yellow-ochreous, with a submetallic grey dorsal stripe. Abdomen dark grey. Legs pale whitish-ochreous, suffusedly banded with grey. Forewings pale yellow-ochreous, tinged in disc with reddish; costal edge dark grey on anterior half; a small dark grey ill-defined spot on base of dorsum, a second larger and suboblong on dorsum before middle, a third at tornus, and a fourth almost apical; a shining leaden-grey streak from beneath base of costa to third dorsal spot; a few dark fuscous scales in disc above extremity of this: cilia grey. Hindwings dark grey; cilia grey.

Albany, West Australia; from September to December, four specimens.

49. *S. xanthoma*, n.sp.

♂. 11-13 mm. Head, palpi, and antennæ shining ochreous-whitish, crown ochreous-yellow. Thorax ochreous-yellow, with a

shining fuscous dorsal stripe. Abdomen dark fuscous. Legs whitish-ochreous, suffusedly banded with dark fuscous. Forewings rather light fuscous, ferruginous-tinged, suffused with dark fuscous towards basal blotch, and towards dorsum and costa posteriorly; an ochreous-yellow basal blotch, extending on dorsum to $\frac{1}{3}$, not quite reaching costa, posterior edge obliquely rounded; a short obscure ochreous-yellow streak along costa before middle; an ochreous-yellow mark along dorsum beyond middle, sometimes obscure; a light ochreous-yellow streak along upper $\frac{2}{3}$ of termen: cilia dark fuscous. Hindwings and cilia dark fuscous, tinged with golden-ferruginous.

Brisbane, Queensland; Sydney, New South Wales; in August and September, three specimens.

50. *S. ischnotis*, n.sp.

♂. 10-13 mm. Differs from *S. crocophanes* only as follows: thorax whitish-yellowish; abdomen whitish ochreous; forewings very perceptibly narrower in proportion, whitish-yellowish, markings paler fuscous and more ochreous-tinged, anterior edge of median fascia nearly straight and much less oblique, cilia paler and tinged with whitish-ochreous.

Carnarvon, West Australia; in October, four specimens.

51. *S. crocophanes*, n.sp.

♂♀. 10-12 mm. Head, palpi, and antennæ shining ochreous-whitish, crown somewhat mixed with fuscous. Thorax yellow. Abdomen grey. Legs whitish-ochreous, anterior pair dark fuscous in front, middle pair greyish. Forewings clear yellow; costal edge dark fuscous from base to $\frac{2}{5}$; a short transverse dark fuscous mark from costa near base; a small indistinct fuscous spot on base of dorsum; apical half fuscous beyond inwards-curved inwardly oblique line, enclosing near its anterior edge a yellow blotch which reaches costa and is sometimes irregularly connected with dorsum; sometimes the fuscous median fascia thus formed is interrupted above middle: cilia light fuscous. Hindwings grey; cilia light fuscous.

Duaringa, Brisbane, and Rosewood, Queensland; Newcastle, Sydney, and Cooma, New South Wales; Georges Bay and Hobart, Tasmania; Adelaide and Heyleton, South Australia; Geraldton and Perth, West Australia; from October to February, very common.

52. *S. callichrysa*, Low.

(*Stathmopoda callichrysa*, Low., Trans. Roy. Soc. S. Austr. 1893, 184).

♂♀. 11-14 mm. Head and palpi shining whitish, crown yellow. Antennæ grey. Thorax dark purplish-fuscous, with two yellow anterior marks. Abdomen dark grey. Legs dark grey, hairs of posterior tibiæ whitish-yellowish. Forewings bright yellow; a small dark purplish-fuscous straight-edged basal patch; apical half beyond a nearly straight slightly inwardly oblique line rather dark purplish-fuscous: cilia fuscous, tinged with golden-ferruginous. Hindwings dark fuscous; cilia as in forewings.

Sydney, New South Wales; Melbourne, Victoria; Port Lincoln, South Australia; Northampton and York, West Australia; in October, November, and March, seven specimens. Has been bred by Mr. J. A. Kershaw from a species of *Acacia*.

53. *S. megathyma*, n sp.

♂♀. 9-12 mm. Head and palpi whitish, back of crown dark reddish-brown. Antennæ white, sharply ringed with dark fuscous. Thorax pale fuscous. Abdomen ochreous-grey-whitish. Legs whitish, banded with dark fuscous. Forewings ochreous-whitish, with some scattered fuscous scales; a pale fuscous dorsal patch extending from base to near $\frac{1}{3}$, reaching $\frac{2}{3}$ across wing; an irregular rounded-triangular dark brown median dorsal patch, reaching more than half across wing, and a semioval dark brown terminal spot above tornus, sometimes confluent; a fuscous mark along costa about $\frac{2}{3}$: cilia pale fuscous, on costa with a dark fuscous patch before apex, preceded by a whitish spot. Hindwings grey; cilia light fuscous.

Sydney and Wollongong, New South Wales; in October, and from January to March, six specimens.

54. *S. liporrhoea*, n.sp.

♂♀. 10-12 mm. Head and palpi shining whitish-ochreous, back of crown ochreous-brown. Antennæ ochreous-whitish, sharply ringed with dark fuscous. Thorax whitish-ochreous, more or less suffused with pale brownish. Abdomen whitish-ochreous or pale grey. Legs whitish-ochreous, banded with dark fuscous. Forewings pale whitish-ochreous, in ♀ suffused with pale brownish except towards costa; costal edge dark fuscous towards base; in ♂ an elongate brown mark along dorsum before tornus, and a smaller one on termen beyond tornus, both sometimes little marked; in ♀ these form small irregular brown blotches reaching $\frac{2}{3}$ across wing: cilia light fuscous. Hindwings grey; cilia light fuscous.

Newcastle and Sydney, New South Wales; Launceston, Tasmania; from October to March, fifteen specimens.

55. *S. canonica*, n.sp.

♂♀. 10-11 mm. Head shining ochreous-white, back of crown ferruginous. Palpi whitish, with a fine dark fuscous line above. Antennæ white, sharply ringed with dark fuscous. Thorax light brown. Abdomen grey. Legs whitish-ochreous, banded with dark fuscous. Forewings ochreous-fuscous; a shining white costal streak from base to apex, sometimes cut at $\frac{4}{5}$ by a fine oblique line of groundcolour; an ill-defined white streak from disc beyond middle to apex, posteriorly confluent with an ill-marked white terminal streak: cilia pale fuscous, on costa with a blackish basal mark towards apex. Hindwings light grey; cilia pale fuscous.

Sydney and Blackheath (3500 feet), New South Wales; in December, January, and March, three specimens.

11. *AEOLOSCELIS*, n.g.

Characters of *Stathmopoda*, but antennæ in ♂ shortly ciliated; forewings with 9 sometimes out of 8 near base.

Type *Ae. hipparcha*. At present not recognised outside Australia; the species closely resemble *Stathmopoda* in appearance and habits.

- | | |
|--|------------------------------|
| 1. Head bronzy-metallic..... | 59. <i>chrysophoenicea</i> . |
| Head whitish or yellowish..... | 2. |
| 2. Forewings with white markings..... | 3. |
| Forewings with fuscous or dark fuscous markings | 4. |
| 3. Second and third fasciæ connected on costa..... | 56. <i>aetheria</i> . |
| Second and third fasciæ not connected on costa.. | 57. <i>hydrographa</i> . |
| 4. Forewings with dark fuscous basal fascia..... | 58. <i>isoclera</i> . |
| Forewings without dark fuscous basal fascia..... | 5. |
| 5. Thorax dark fuscous | 60. <i>hipparcha</i> . |
| Thorax whitish-ochreous..... | 61. <i>sphragidota</i> . |

56. *Ae. aetheria*, n.sp.

♂♀. 9-12 mm. Head, palpi, and thorax shining white. Antennæ white, ringed with fuscous. Abdomen pale yellow-ochreous, sides white. Legs white, banded with ochreous mixed with black. Forewings pale ochreous, with numerous irregularly strewn black scales in disc and towards middle and base of dorsum; markings shining white; three straight inwardly oblique fasciæ, first subbasal, suffused, second at $\frac{1}{3}$, third median, connected with second on costa; a transverse line at $\frac{2}{3}$, strongly curved outwards on upper half and inwards on lower half; apex white: cilia whitish-ochreous, with a black subbasal line round apex. Hindwings light grey; cilia whitish-ochreous.

Sydney, New South Wales; in December, February, and April, three specimens.

57. *Ae. hydrographa*, n.sp.

♀. 13 mm. Differs from *Ae. aetheria* only as follows: forewings almost without black scales, second and third fasciæ not connected on costa, cilia without black line, hindwings darker grey.

Brisbane, Queensland; one specimen (Dr. A. J. Turner).

58. *Ae. isoclera*, n.sp.

♂. 14 mm. Head and palpi shining whitish, back of crown pale yellow. Antennæ whitish. Thorax and abdomen dark fuscous. Legs dark fuscous, ringed with whitish. Forewings very narrow, light yellow; a dark fuscous basal fascia, narrowly produced on costa to $\frac{1}{4}$; a dark fuscous inwardly oblique median fascia; area beyond this fuscous-tinged, with a dark fuscous spot at $\frac{3}{4}$ resting on termen: cilia fuscous. Hindwings dark fuscous; cilia fuscous.

Brisbane, Queensland; one specimen (Dr. A. J. Turner).

59. *Ae. chrysophoenicea*, n.sp.

♂♀. 10-12 mm. Head shining bronzy-metallic. Palpi light ochreous-yellowish. Antennæ fuscous, with a broad whitish subapical band. Thorax shining dark purplish-bronzy. Abdomen yellow-ochreous, apical half dark fuscous. Legs dark fuscous ringed with yellowish. Forewings deep yellow; markings shining dark purplish-bronzy-fuscous; a basal fascia; a broad somewhat inwardly oblique antemedian fascia; a terminal fascia, widest on costa, anterior edge sometimes angularly prominent near tornus: cilia dark fuscous. Hindwings and cilia dark fuscous.

Rosewood, Queensland; in September, six specimens.

60. *Ae. hipparcha*, n.sp.

♂♀. 14-16 mm. Head and palpi whitish-ochreous, back of crown ochreous-yellow. Antennæ ochreous-whitish, indistinctly ringed with fuscous. Thorax dark fuscous, with an ochreous-yellow anterior spot. Abdomen whitish-ochreous. Legs whitish-ochreous, banded with dark fuscous. Forewings ochreous-yellow to whitish-ochreous; sometimes a dark fuscous costal streak from base to middle; a straight slender inwardly oblique dark fuscous median fascia, variably interrupted or dorsally dilated or reduced to a dorsal spot only; a small dark fuscous tornal spot, sometimes obsolete; a variable dark fuscous mark along upper part of termen: cilia light greyish-ochreous, on costa whitish-ochreous, with a

rather dark fuscous apical bar. Hindwings grey; cilia light greyish-ochreous.

Geraldton, West Australia; in October and November, fourteen specimens.

61. *Ae. sphragidota*, n.sp.

♂♀. 11-14 mm. Head and palpi shining ochreous-whitish, back of crown ferruginous-ochreous. Antennæ ochreous-whitish, towards base ringed, then suffused with grey. Thorax whitish-ochreous or pale yellow-ochreous. Abdomen whitish-ochreous. Legs whitish-ochreous, banded with dark fuscous. Forewings whitish-ochreous; a semicircular fuscous median dorsal spot, reaching half across wing, sometimes extended to form a broad irregular inwardly oblique postmedian fascia: cilia pale greyish-ochreous. Hindwings grey; cilia pale greyish-ochreous.

Geraldton and Carnarvon, West Australia; in October and November, five specimens.

12. *PERSICOPTILA*, Meyr.

Antennæ $\frac{5}{8}$, in ♂ shortly ciliated. Labial palpi very long, recurved, smooth-scaled, terminal joint longer than second, acute. Posterior tibiae with large triangular median tuft of dense hair-scales above. Forewings: 1b furcate, 6 out of 7, 7 to costa, 8 out of 7. Hindwings $\frac{3}{5}$, elongate-lanceolate, cilia 4; 6 and 7 connate.

Founded on a Fijian species, with which the four following Queensland species agree in all respects; probably the genus will prove to be rather numerous in tropical Queensland. It is doubtless a development of *Pyroderces*. Imago with forewings elongate-lanceolate, long-pointed; I have seen none of the species alive, and know nothing of their habits, but the tufted posterior legs are perhaps displayed; it is singular that these four species were all received from a single collector.

- | | |
|---|----|
| 1. Forewings purplish-crimson or with purplish markings | 2. |
| Forewings without purple colouring | 3. |

2. Forewings orange with two purplish bands..... 64. *mimochora*.
 Forewings crimson with triangular yellow costal
 blotch..... 63. *peltias*.
 3. Forewings orange with whitish-ochreous markings 62. *hesperis*.
 Forewings brownish-ochreous with white markings 65. *aphrosema*.

62. *P. hesperis*, n.sp.

♂. 12 mm. Head and palpi whitish. Antennæ whitish-ochreous. Thorax whitish, anterior edge suffused with yellow-ochreous. Legs ochreous-whitish, tibiae suffusedly banded with deep ochreous-yellow, tuft of posterior pair somewhat fuscous-mixed. Forewings orange, paler towards base; an indistinct whitish-ochreous fascia at $\frac{1}{4}$; a moderately broad straight whitish-ochreous median fascia; plical and second discal stigmata fuscous, former immediately preceding median fascia, latter resting on a whitish-ochreous longitudinal discal spot confluent posteriorly with a slender whitish-ochreous fascia at $\frac{4}{5}$; cilia whitish-ochreous. Hindwings pale grey; cilia whitish-ochreous.

Brisbane, Queensland; one specimen (Dr. A. J. Turner).

63. *P. peltias*, n.sp.

♂. 16 mm. Abdomen pale ochreous. Legs ochreous-whitish, tibiae suffused with pale crimson, somewhat blackish-mixed. Forewings light dull purplish-crimson; an indistinct yellowish suffusion in disc anteriorly; discal stigmata fuscous, second more suffused; a light yellow triangular costal blotch beyond middle, nearly reaching dorsum; an indistinct pale yellowish discal dot at $\frac{3}{4}$; a small pale yellow antepical costal spot: cilia pale ochreous, towards base crimson-tinged. Hindwings fuscous, towards costa suffusedly whitish-ochreous; cilia whitish-ochreous, slightly purplish-tinged.

Brisbane, Queensland; one partially defective specimen (Dr. A. J. Turner).

64. *P. mimochora*, n.sp.

♂. 10-11 mm. Head, palpi, and antennæ whitish-ochreous, crown and second joint of palpi white. Thorax yellow-ochreous,

posteriorly whitish. Abdomen pale yellow-ochreous, mixed with black towards middle. Legs white, tibiae barred with blackish, tuft of posterior tibiae whitish-orange. Forewings orange; a broad band extending from near base to middle, and a broad fascia towards apex light purple densely irrorated with blackish, former followed dorsally by a whitish-ochreous suffusion, latter including a whitish-ochreous costal dot and anterior discal ring: cilia whitish-ochreous, fuscous-tinged, round apex pale orange. Hindwings whitish-ochreous, apex infuscated; cilia whitish-ochreous.

Brisbane, Queensland; two specimens (Dr. A. J. Turner).

65. *P. aphrosema*, n.sp.

♀. 12 mm. Head whitish. Palpi whitish, apex of second joint, and median and subapical bands of terminal dark fuscous. Antennae white, ringed with dark fuscous. Thorax white, with a fuscous anterior spot. Abdomen ochreous-whitish. Legs whitish, banded with dark fuscous, tuft of posterior tibiae suffused with pale orange. Forewings brownish-ochreous, with some irregularly strewn blackish scales, tending to form spots on margins of white markings, an irregular white subcostal spot towards base; irregular white dorsal spots at base, $\frac{1}{5}$, and before middle; an irregular white fascia from $\frac{1}{4}$ of costa, not reaching dorsum; a larger irregular white tornal spot, preceded by a blackish suffusion; an irregular white streak from middle of costa to middle of termen, edged beneath with blackish suffusion, abruptly dilated near costa, somewhat interrupted below middle; some white scales towards costa posteriorly, and a white apical dot: cilia pale ochreous, round apex whitish with a blackish median line. Hindwings grey, paler towards base; cilia whitish-ochreous.

Brisbane, Queensland; one specimen (Dr. A. J. Turner).

13. ELACHISTA, Treits.

Antennae $\frac{3}{4}$ - $\frac{5}{8}$, in ♂ sometimes shortly ciliated. Labial palpi long, curved, ascending, second joint smooth-scaled, terminal

shorter, acute. Posterior tibiæ rough-haired. Forewings in ♂ beneath sometimes with expansible hair-pencil from dorsum near base; 1b simple, 4 sometimes absent, 5 absent, 6 out of 7, 7 to costa, 8 out of 7 or absent, 9 sometimes out of 7. Hindwings $\frac{1}{2}$ - $\frac{2}{3}$, narrow-lanceolate, cilia 3-6; 4 sometimes absent, 5 absent, transverse vein sometimes partly absent, 6 and 7 stalked.

A large cosmopolitan genus, most numerous in northern temperate regions. It is a development of *Pyroderces*. Imago with forewings lanceolate; the species are generally obscure in colouring, and often hard to distinguish. All the known larvæ mine in leaves or stems of *Gramineæ* or *Cyperaceæ*.

- | | |
|--|----------------------------|
| 1. Terminal joint of palpi with dark fuscous lateral or anterior line..... | 2. |
| Terminal joint of palpi without longitudinal line... | 3. |
| 2. Cilia of forewings grey-whitish..... | 67. <i>cataptila</i> . |
| Cilia of forewings fuscous, blackish-sprinkled..... | 68. <i>cynopa</i> . |
| 3. Palpi wholly dark fuscous, pale-sprinkled..... | 4. |
| Palpi not wholly dark fuscous..... | 5. |
| 4. Plical and second discal stigmata large, dark fuscous | 77. <i>erebophthalma</i> . |
| Plical and second discal stigmata obsolete..... | 78. <i>cataruta</i> . |
| 5. Hindwings with large patch of black scales..... | 75. <i>arctodyta</i> . |
| Hindwings without black patch..... | 6. |
| 6. Forewings with opposite pale spots at $\frac{3}{4}$ | 66. <i>synethes</i> . |
| Forewings without pale spots..... | 7. |
| 7. Terminal joint of palpi with dark subapical ring.... | 8. |
| Terminal joint of palpi without such ring..... | 10. |
| 8. Head irrorated with dark fuscous..... | 76. <i>argopis</i> . |
| Head not irrorated with dark fuscous..... | 9. |
| 9. Forewings whitish, first discal stigma distinct..... | 73. <i>toropis</i> . |
| Forewings grey, first discal stigma absent..... | 74. <i>demogenes</i> . |
| 10. First discal stigma above or before plical..... | 10. |
| First discal stigma much beyond plical..... | 11. |
| 11. Forewings with indistinct black line in disc anteriorly..... | 69. <i>chloropepla</i> . |
| Forewings without blackish line..... | 72. <i>cycotis</i> . |
| 12. Genital tuft of ♂, anal segment of ♀ black..... | 71. <i>melanura</i> . |
| Genital tuft of ♂, anal segment of ♀ pale..... | 70. <i>gerasmia</i> . |

Sect. A. Vein 4 absent in both wings.

66. *E. synethes*, n.sp.

♂♀. 6-8 mm. Head whitish-fuscous, crown irrorated with dark fuscous. Palpi whitish, second joint more or less irrorated with blackish, terminal joint with black basal ring and median band. Antennæ fuscous. Thorax pale fuscous irrorated with dark. Abdomen dark fuscous. Legs dark fuscous, ringed with whitish. Forewings whitish-fuscous, with a coppery-brown gloss in disc, especially beyond fascia, in ♂ wholly irrorated with dark fuscous, in ♀ sprinkled thinly on basal area, elsewhere densely irrorated with black; a short blackish streak above fold towards base; a slightly curved rather oblique narrow whitish fascia before middle, in ♀ whiter and more distinct, in ♂ followed by cloudy blackish spots above and below middle, which in ♀ are merged in the general black irroration; two opposite whitish costal and dorsal spots at $\frac{3}{4}$, separated by a black discal dot, in ♂ indistinct, in ♀ white, larger, subquadrate; a white apical dot: cilia fuscous, sprinkled with black and whitish points, with a black median line round apex. Hindwings dark fuscous; cilia fuscous.

Sydney and Kiama, New South Wales; Melbourne, Victoria; Deloraine, Georges Bay, and Hobart, Tasmania; Albany and Perth, West Australia; from June to January, very common. This species is closely allied to the New Zealand *E. archæonoma*; it frequents dry grassy way-sides.

67. *E. cataptila*, n.sp.

♂. 7-8 mm. Head whitish sprinkled with grey. Palpi whitish with a black lateral line, towards tips of second and terminal joints blackish-suffused. Antennæ grey spotted with blackish. Thorax grey-whitish sprinkled with black. Abdomen grey. Legs grey-whitish banded with black. Forewings with dorsal hair-pencil beneath; grey-whitish, irrorated with black or dark grey; an ill-defined blackish discal streak from base to near middle;

plical and second discal stigmata black, plical at $\frac{1}{2}$: cilia grey-whitish. Hindwings grey; cilia whitish-grey.

Carnarvon, West Australia; in October, two specimens.

Sect. B. Vein 4 present in both wings.

68. *E. cynopa*, n.sp.

♂♀. 7-8 mm. Head whitish-fuscous, crown irrorated with dark fuscous. Palpi whitish, second joint irrorated with dark fuscous, terminal joint with dark fuscous line in front and subapical band. Antennæ fuscous. Thorax fuscous, darker-sprinkled. Abdomen dark fuscous. Legs dark fuscous, ringed with whitish. Forewings whitish-fuscous, densely irrorated with dark fuscous; plical and second discal stigmata dark fuscous, plical somewhat before middle, both sometimes followed by whitish scales: cilia fuscous, round apex sprinkled with paler and black. Hindwings rather dark fuscous; cilia fuscous.

Sydney and Bulli, New South Wales; in September and October, five specimens.

69. *E. chloropepla*, n.sp.

♂. 9-10 mm. Head whitish, crown mixed with fuscous. Palpi whitish, somewhat fuscous-sprinkled, second joint fuscous except apex. Antennæ fuscous. Thorax fuscous, whitish-sprinkled. Abdomen ochreous-whitish. Legs ochreous-whitish, anterior and middle tibiæ and tarsi dark fuscous. Forewings fuscous, irrorated with whitish; an indistinct black longitudinal line in disc from near base to near middle; stigmata elongate, blackish, plical at $\frac{1}{2}$, first discal little marked, directly above plical, second discal strong: cilia whitish-fuscous, round apex sprinkled with dark fuscous and whitish, with a black subapical line, and a black longitudinal apical dash. Hindwings grey; cilia whitish fuscous.

Blackheath (3500 feet), New South Wales; in March, two specimens.

70. *E. gerasmia*, Meyr.

(*E/achista gerasmia*, Meyr., Trans. N. Zeal. Inst. 1888, 177.)

♂♀. 9-12 mm. Head, palpi, and thorax grey-whitish or ochreous-whitish, sprinkled with fuscous. Antennæ light grey.

Abdomen ochreous-grey-whitish. Legs dark fuscous, pale-speckled, posterior tibiae ochreous-whitish. Forewings ochreous-grey-whitish, more or less irrorated with fuscous; sometimes some blackish scales towards fold anteriorly; stigmata black, plical and second discal strongly marked, somewhat elongate, plical near before middle, first discal midway between and above these, ill-defined or almost obsolete: cilia ochreous-grey-whitish, round apex usually black-sprinkled, sometimes forming a thick irregular interrupted black basal line on upper part of termen, and a subapical line opposite it. Hindwings grey; cilia whitish-ochreous-grey.

Sydney, New South Wales; Hobart, Tasmania; Adelaide and Port Lincoln, South Australia; Albany and Perth, West Australia; also widely distributed in New Zealand; from September to March, common.

71. *E. melanura*, Meyr.

(*Elachista melanura*, Meyr., Trans. N. Zeal. Inst. 1888, 177.)

♂♀. 10-13 mm. Head, palpi, antennæ, thorax, and abdomen ochreous-whitish; abdomen elongate, in ♂ with dense black exsertible genital tuft, in ♀ with anal segment black above. Legs dark fuscous, posterior pair ochreous-whitish. Forewings ochreous-whitish, sometimes finely sprinkled with fuscous; plical and second discal stigmata elongate, blackish, plical rather before middle, first discal more or less obsoletely indicated, above and midway between the other two: cilia ochreous-whitish, round apex sometimes black-sprinkled. Hindwings pale grey or whitish-grey; cilia ochreous-grey-whitish.

Sydney, New South Wales; Port Lincoln, South Australia; Albany, West Australia; occurs also in New Zealand; in September, November; and January, four specimens. The specimen originally described from New Zealand is more grey-sprinkled throughout, with the black scales in cilia of forewings more developed.

72. *E. cycotis*, n.sp.

♂♀. 7-9 mm. Head, palpi, antennæ, thorax, and abdomen whitish-ochreous, sometimes brownish-tinged. Legs dark fuscous,

ringed with whitish-ochreous. Forewings whitish-ochreous, sometimes brownish-tinged, more or less finely sprinkled with fuscous; a few black scales towards fold anteriorly; stigmata blackish, plical large, elongate, first discal rather obliquely before plical, often indistinct, second often also indistinct: cilia whitish-ochreous, sometimes blackish-sprinkled round apex. Hindwings grey; cilia pale grey.

Mount Kosciusko (6000 feet), New South Wales; Deloraine, Tasmania; from November to January, nine specimens.

73. *E. toropis*, n.sp.

♂. 9 mm. Head and thorax whitish. Palpi whitish, terminal joint with dark grey basal and subapical rings. Antennæ grey. Abdomen grey-whitish. Legs grey, posterior tibiæ ochreous-whitish. Forewings ochreous-whitish, slightly fuscous-sprinkled; stigmata black, round, plical at $\frac{2}{3}$, first discal rather obliquely beyond and above plical, much more widely remote from second discal: cilia ochreous-whitish, with a very few dark fuscous points. Hindwings light grey; cilia whitish-grey.

Albany, West Australia; in October, one specimen.

74. *E. demogenes*, n.sp.

♂♀. 7-8 mm. Head whitish. Palpi whitish, with blackish subapical bands on second and terminal joints. Antennæ grey spotted with blackish. Thorax and abdomen grey. Legs grey-whitish banded with dark fuscous. Forewings in ♂ with dorsal hair-pencil beneath; pale grey irrorated with dark fuscous; sometimes a suffusion of black irroration towards dorsum anteriorly and towards costa posteriorly; plical and second discal stigmata black, plical at $\frac{2}{3}$: cilia pale grey. Hindwings grey, cilia pale grey.

Quorn, South Australia; in October, seven specimens.

75. *E. arctodyta*, n.sp.

♀. 8 mm. Head, palpi, antennæ, and thorax whitish-fuscous. Abdomen black above, with some irregularly strewn white

scales, beneath ochreous-whitish. Legs ochreous-whitish, fuscous-sprinkled. Forewings whitish-fuscous, irregularly sprinkled with dark fuscous; plical and second discal stigmata small, dark fuscous, indistinct: cilia whitish-fuscous. Hindwings grey; a patch of modified black scales extending along termen from near base to $\frac{3}{4}$, and reaching more than half across wing: cilia whitish-fuscous. Forewings beneath with dorsal half suffused with dark fuscous.

Carnarvon, West Australia; in October, one specimen. The ♂ may probably show peculiar sexual characteristics corresponding to the black scale-patch of the ♀.

76. *E. argopis*, n.sp.

♂♀. 8.9 mm. Head white, crown more or less irrorated with dark fuscous. Palpi white, second joint with subapical ring and more or less developed lateral suffusion beneath it, terminal joint with basal and median rings blackish. Antennæ dark fuscous spotted with whitish. Thorax dark fuscous irrorated with white, apex of patagia clear white. Abdomen dark grey, sides and apex whitish. Legs white banded with blackish. Forewings white irrorated with dark fuscous; an indistinct blackish line on fold; plical and second discal stigmata cloudy, indistinct, dark fuscous or blackish, plical followed in ♂ by a clear white spot extending to dorsum: cilia grey, basal $\frac{3}{4}$ round apex white irrorated with black. Hindwings rather dark grey; cilia light grey.

York, West Australia; in November, three specimens.

77. *E. erebophthalma*, n.sp.

♂♀. 8.9 mm. Head, palpi, antennæ, thorax, abdomen, and legs dark fuscous, paler-sprinkled, legs whitish-ringed. Forewings fuscous, irrorated with dark fuscous; plical and second discal stigmata large, dark fuscous, plical preceded by a few whitish scales: cilia fuscous, irrorated with dark fuscous. Hindwings and cilia dark fuscous.

Warragul, Victoria; in December, three specimens.

78. *E. catarata*, n.sp.

♂. 8 mm. Head, palpi, antennæ, thorax, abdomen, and legs blackish-fuscous, finely whitish-speckled, legs whitish-ringed. Forewings blackish-fuscous, finely speckled with ashy-whitish; an ochreous-whitish plical dot before middle: cilia fuscous irrorated with black. Hindwings and cilia dark fuscous.

Deloraine, Tasmania; in November, one specimen.

14. COSMOPTERYX, Hüb.

Antennæ nearly 1, in ♂ simple. Labial palpi very long, recurved, second joint smooth, terminal longer, acute. Posterior tibiæ rough-haired. Forewings: 1b furcate, 5 sometimes absent or out of 7, 6 out of 7, 7 to costa, 8 out of 7. Hindwings $\frac{1}{2}$, linear, cilia 5-7; transverse vein absent, 3 sometimes absent, 4 absent, 5 absent.

A small cosmopolitan genus, derived from *Pyroderces*, possibly Indo-Malayan in origin, but apparently nowhere numerous. Imago with forewings very narrow, long-pointed or caudate; the species are very elegant in colouring, but require careful discrimination. The known larvæ mine in leaves; those of the Australian species may not improbably be attached to *Gramineæ*.

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|--|------------------------|
| 1. Forewings with yellow or orange fascia..... | 2. |
| Forewings without such fascia..... | 79. <i>mystica</i> . |
| 2. Forewings with white subcostal line from base of costa..... | 3. |
| Forewings without such line..... | 82. <i>heliactis</i> . |
| 3. Hindwings dark grey..... | 4. |
| Hindwings pale grey..... | 83. <i>epizona</i> . |
| 4. Abdomen yellow-ochreous or brown..... | 81. <i>macrula</i> . |
| Abdomen dark grey..... | 80. <i>mimetis</i> . |

79. *C. mystica*, n.sp.

♂. 8 mm. Head silvery-white. Thorax black, streaked with pale golden-metallic. Abdomen dark grey, basal half sprinkled with pale golden-metallic. Legs dark fuscous, posterior pair ringed with silvery-whitish. Forewings blackish, markings pale

violet-golden-metallic; three longitudinal streaks from base, subcostal reaching $\frac{1}{4}$, median longer, subdorsal nearly reaching middle; a slightly outwards-oblique narrow fascia before middle, and another inwards-oblique at $\frac{2}{3}$; a costal dot beyond this, surmounted by a white spot in cilia; a fine terminal streak running to apex: cilia dark fuscous, with a white apical bar. Hindwings and cilia dark fuscous.

Sydney, New South Wales; in June, one specimen, of which the head was unfortunately destroyed subsequently by an accident.

80. *C. mimetis*, n.sp.

♂♀. 8-10 mm. Head dark fuscous, with fine central and lateral white lines on crown. Palpi white, with black lateral longitudinal line. Antennæ dark fuscous, whitish-dotted, with two narrow whitish bands about $\frac{2}{3}$ and another before apex. Thorax dark fuscous, with three longitudinal white lines. Abdomen dark grey. Legs blackish, ringed with white. Forewings blackish-fuscous; a fine white subcostal line from near base of costa to $\frac{1}{4}$, and two short fine white lines beneath apex of this, widely remote from base and fascia; a broad postmedian orange fascia, narrowed downwards, margined by narrow pale golden-metallic fasciæ, first edged posteriorly by a minute black dot above middle, second edged anteriorly with some black scales, and interrupted above middle by an orange projection; a white line from near beyond this along termen to apex: cilia blackish, with a white spot on costal end of second metallic fascia, and a white bar at apex. Hindwings and cilia dark fuscous.

Newcastle and Sydney, New South Wales; in August, September, January, and February, five specimens.

81. *C. macrula*, n.sp.

♂♀. 8-10 mm. Head dark brown, with fine central and lateral white lines on crown. Palpi white, with black lateral longitudinal line. Antennæ as in *C. mimetis*, but more suffused with whitish. Thorax dark brown, with three longitudinal white lines. Abdomen yellow-ochreous or brown, margins white. Legs

dark fuscous ringed with white. Forewings dark yellowish-brown; a fine white subcostal line from base of costa to $\frac{1}{2}$, two fine white lines in disc beneath it more or less nearly reaching base and fascia, and one along dorsum from base to or near fascia; a short white costal streak preceding fascia; a broad pale orange postmedian fascia, narrowed downwards, margined by narrow pale golden-metallic fasciæ, first edged posteriorly by a black dot above middle, second edged anteriorly with some black scales and usually interrupted above middle by an orange projection; from beyond this a white terminal streak to apex: cilia on costa whitish, more or less fuscous-tinged on a patch beyond second fascia, round apex blackish, beneath fuscous. Hindwings and cilia dark grey.

Brisbane, Queensland; Sydney, New South Wales; in September, and from January to March, six specimens.

82. *C. heliactis*, n.sp.

♂. 8 mm. Head bronzy-fuscous, face silvery-metallic. Palpi white, with black lateral longitudinal line. Antennæ dark fuscous. Thorax ferruginous-fuscous, with a silvery-white posterior mark. Abdomen dark fuscous, margins silvery-metallic. Legs dark fuscous, ringed with silvery-whitish. Forewings ferruginous-fuscous, orange-tinged; dorsum finely whitish towards base; an oblique transverse series of three short bluish-silvery-white dashes beyond $\frac{1}{4}$; a rather broad light orange postmedian fascia, narrowed downwards, margined by narrow internally black-edged pale violet-golden-metallic fasciæ; a silvery-metallic dot on termen towards apex: cilia blackish, with a white spot above second metallic fascia, and a white apical bar. Hindwings and cilia blackish-fuscous.

Toowoomba (2000 feet), Queensland; in December, one specimen.

83. *C. epizona*, n.sp.

♂. 10 mm. Head bronzy-fuscous, with fine central and lateral whitish lines on crown. Palpi white, with black lateral longitudinal line. Antennæ dark fuscous, with longitudinal whitish

lines, and an apical band and subapical ring whitish. Thorax fuscous, with five longitudinal whitish lines. Legs dark fuscous, obliquely ringed with white. Forewings fuscous; a white subcostal line from base of costa to $\frac{1}{3}$; median and subdorsal white lines from base to fascia; dorsum narrowly white on basal $\frac{1}{4}$; a white costal streak from $\frac{1}{4}$ to $\frac{3}{4}$; a moderate yellow postmedian fascia, margined by narrow silvery-metallic fasciæ, first interrupted in middle and followed by a black dot above middle, second bent inwards in middle and preceded on costa by a fuscous spot; a yellow patch immediately following second fascia, whence proceeds a white terminal streak to apex: cilia fuscous-whitish, white on costa except towards apex, with a white apical bar. Hindwings pale grey; cilia grey-whitish.

Brisbane, Queensland; one specimen (Mr. G. Barnard).

15. PYRODERCES, Zell.

Antennæ $\frac{4}{5}$, in ♂ minutely ciliated. Labial palpi very long, recurved, smooth or slightly rough beneath, terminal joint longer than second, acute. Thorax in ♂ sometimes with long expansible lateral hair-pencil from beneath hindwings. Posterior tibiæ rough-haired. Forewings in ♂ sometimes with expansible pencil of long hairs from dorsum towards base beneath; 1b furcate, 5 sometimes out of 7, 6 out of 7, 7 to costa, 8 out of 7, 9 sometimes out of 7. Hindwings $\frac{1}{2}$ - $\frac{3}{5}$, narrow-lanceolate or linear-lanceolate, cilia 3-7; 6 and 7 sometimes stalked, seldom coincident.

The variations in the scaling of the palpi, certain points of neuration, and the presence or absence of expansible hair-pencils on the forewings or thorax of the ♂, which occur in some species of this genus, seem from an extended study of a number of forms to be here insufficient for generic subdivision, (the same being the case in the allied genera *Elachista* and *Limnoecia*), and I have therefore sunk as synonyms of this genus *Stagmatophora*, HS., *Labdia*, Walk., and *Proterocosma*, Meyr. The genus is widely distributed, especially in warm regions. Imago with forewings lanceolate; during life the eyes are often crimson.

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| 1. Abdomen at least partly orange or yellow..... | 2. |
| Abdomen not partly orange or yellow..... | 7. |
| 2. Abdomen with terminal half dark fuscous..... | 3. |
| Abdomen with terminal half paler orange..... | 6. |
| 3. Cilia of hindwings yellowish towards tornus..... | 4. |
| Cilia of hindwings not yellowish..... | 5. |
| 4. Forewings with clear yellow postmedian band.... | 84. <i>deliciosella</i> . |
| Forewings without yellow band.. | 90. <i>cyanogramma</i> . |
| 5. Forewings orange..... | 88. <i>ceraunia</i> . |
| Forewings ferruginous..... | 92. <i>mesophila</i> . |
| 6. Postmedian whitish fascia followed by a whitish-ochreous dorsal patch..... | 86. <i>schismatias</i> . |
| Postmedian whitish fascia not followed by a whitish-ochreous patch.. | 85. <i>chryselectra</i> . |
| 7. Forewings wholly dark fuscous..... | 8. |
| Forewings not wholly dark fuscous..... | 9. |
| 8. Forewings broader, shining, wholly unmarked.... | 109. <i>eumelaena</i> . |
| Forewings narrower, dull, stigmata indistinctly darker..... | 110. <i>semmostola</i> . |
| 9. Forewings with four metallic fasciæ..... | 10. |
| Forewings without metallic fasciæ..... | 11. |
| 10. Antennæ with apical third white..... | 102. <i>argyrostrepta</i> . |
| Antennæ wholly dark fuscous..... | 101. <i>tetradesima</i> . |
| 11. Forewings with broad yellowish-white postmedian band..... | 87. <i>leucombra</i> . |
| Forewings without such band..... | 12. |
| 12. Antennæ dark, apical third white..... | 100. <i>oxytoma</i> . |
| Antennæ with apical third not contrasted..... | 13. |
| 13. Antennæ wholly whitish..... | 14. |
| Antennæ not wholly whitish..... | 15. |
| 14. Forewings with one posterior costal whitish spot | 98. <i>promacha</i> . |
| Forewings with two posterior costal whitish spots | 99. <i>oxysema</i> . |
| 15. Antennæ wholly dark..... | 16. |
| Antennæ whitish, dark-ringed..... | 18. |
| 16. Head white..... | 107. <i>pileata</i> . |
| Head dark..... | 17. |
| 17. Forewings with whitish markings..... | 91. <i>arimaspia</i> . |
| Forewings without whitish markings..... | 111. <i>exodroma</i> . |
| 18. Abdomen grey, basal half whitish-ochreous..... | 97. <i>charisia</i> . |
| Abdomen with basal half not contrasted..... | 19. |
| 19. Thorax dark fuscous..... | 20. |
| Thorax not dark fuscous.. | 21. |
| 20. Forewings with white median fascia..... | 105. <i>nesophora</i> . |
| Forewings with white median opposite spots..... | 104. <i>trivincta</i> . |

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| 21. Forewings with white median streak from base to $\frac{1}{3}$ | 103. <i>bathrosema</i> . |
| Forewings without such streak..... | 22. |
| 22. Forewings with whitish markings..... | 23. |
| Forewings without whitish markings..... | 108. <i>anarithma</i> . |
| 23. Groundcolour ferruginous or reddish-tinged..... | 24. |
| Groundcolour not reddish-tinged..... | 27. |
| 24. Forewings with white dorsal streak to $\frac{1}{4}$ | 89. <i>hierarcha</i> . |
| Forewings without white dorsal streak..... | 25. |
| 25. Forewings with triangular median blotch of black
irroration..... | 93. <i>anaclastis</i> . |
| Forewings without such blotch..... | 26. |
| 26. Forewings with pale or whitish median fascia..... | 94. <i>terminella</i> . |
| Forewings without such fascia..... | 95. <i>pyrrhodes</i> . |
| 27. Forewings with three entire whitish fasciæ..... | 106. <i>bryomima</i> . |
| Forewings without such fasciæ..... | 96 <i>sphenosema</i> . |

84. *P. deliciosella*, Walk.(*Labdia deliciosella*, Walk. Tin. 823.)

♂♀. 12-18 mm. Head ochreous-white, crown ochreous-brown. Palpi slender, whitish, second joint ochreous-tinged, terminal joint with a black line in front. Antennæ white, ringed with dark fuscous, towards apex without rings but with three dark fuscous bands. Thorax ochreous-brown, with a white central line. Abdomen golden-orange, terminal half dark fuscous. Legs light ochreous, tarsi banded with dark fuscous. Forewings ochreous-orange, brownish-tinged towards base and towards middle; very fine white black-edged lines along costa and fold from base to middle; a similar line from base of costa to disc at $\frac{1}{3}$, another from beneath apex of this to near middle, another similarly placed beneath fold, a short one beneath costa before middle, and a short subdorsal one from base; a broad clear yellow postmedian band extending to near apex, anterior edge rather oblique, indented upwards below middle, posterior edge angulated so as to be very oblique costally, enclosing a short black postmedian costal strigula, and a golden-metallic postmedian subdorsal spot; narrow apical area suffused with blackish, cut at $\frac{5}{8}$ by two pale yellow strigulae enclosing a black strigula: cilia fuscous, towards base yellowish, round apex blackish, with a yellow-whitish basal spot

at apex. Hindwings blackish; a transparent subcostal patch towards base: cilia dark purplish-fuscous, becoming light ochreous-orange towards tornus.

Brisbane, Queensland; Newcastle and Sydney, New South Wales; from September to January, apparently local but very common where it occurs.

85. *P. chryselectra*, n.sp.

♀. 14-15 mm. Head ochreous-orange, with a silvery central line, face shining whitish-ochreous. Palpi slender, whitish, second joint orange-tinged, terminal joint with black lateral and anterior lines. Antennæ white, ringed with dark fuscous, towards apex without rings but with two dark fuscous bands. Thorax ochreous-orange, with three silvery lines. Abdomen ochreous-orange, paler posteriorly. Legs whitish, ringed with dark fuscous. Forewings coppery-orange; markings shining prismatic-silvery; a costal line from base, one from beneath costa before $\frac{1}{3}$, one from beneath costa near base confluent at $\frac{1}{3}$ with another along fold from base, all terminating in postmedian fascia; dorsal edge ochreous-whitish from base to middle; an ochreous-whitish dorsal curved mark at $\frac{1}{3}$; a slender vertical ochreous-whitish postmedian fascia, enclosing a black metallic-edged costal strigula, edged anteriorly beneath middle with black and metallic scales, and followed by a subdorsal spot of mixed black and metallic scales; a vertical black metallic-edged costal strigula at $\frac{2}{3}$, margined by ochreous-whitish strigula; a bright leaden-metallic black-sprinkled streak near termen from above tornus to near apex: cilia ochreous. Hindwings dark grey; cilia grey, towards termen ochreous-tinged.

Brisbane, Queensland; in September, two specimens.

86. *P. schismatias*, n.sp.

♂♀. 12-14 mm. Head and thorax ochreous-orange, with a white line on each side of back, face white. Palpi slender, whitish, second joint orange-tinged, terminal joint with black

anterior line and sometimes more or less suffused with blackish. Antennæ white ringed with blackish, towards apex without rings but with three blackish bands. Abdomen ochreous-orange, paler posteriorly. Legs whitish, ringed with dark fuscous. Forewings ochreous-orange; a fine white costal line from base to $\frac{2}{3}$; a white finely fuscous-edged line from costa near base to disc at $\frac{1}{3}$, a short one beneath apex of this almost touching fold, another from beneath costa before middle to disc at $\frac{2}{3}$, one along fold from base interrupted at $\frac{1}{3}$ and before fascia, and one along dorsum from base to middle; a white subdorsal spot before middle; a narrow white vertical fascia at $\frac{2}{3}$, enclosing a dark fuscous costal strigula, and followed by a whitish-ochreous dorsal patch reaching half across wing, in which is a subdorsal dot of black and silvery-metallic scales; a dark fuscous costal strigula at $\frac{5}{8}$, margined by white strigulae, resting on the whitish-ochreous patch: cilia whitish-ochreous, round apex orange-tinged, towards tornus purplish-tinged. Hindwings dark grey; cilia grey.

Brisbane, Queensland; in September, three specimens.

87. *P. leucombra*, n.sp.

♂. 10 mm. Head and thorax coppery-ochreous, with a white line on each side of back, face white. Palpi slender, white, second joint orange-tinged. Antennæ white with a dark grey line above, towards apex without line but with two dark grey bands. Abdomen whitish. Legs whitish, ringed with dark grey. Forewings ferruginous-ochreous; a fine bluish-silvery curved line from base of costa to $\frac{1}{2}$ of disc, another from beneath costa at $\frac{1}{3}$ to middle of postmedian band, and a short dash beneath apex of first one; a white line along fold, interrupted at $\frac{1}{3}$ and before band; a suffused whitish spot beneath this before middle; a broad yellowish-white vertical postmedian band, extending to $\frac{4}{5}$ of costa and emitting a terminal streak to apex, enclosing two vertical dark fuscous costal strigulae near its margins, and a dorsal spot of black and leaden-metallic scales near its anterior margin: cilia whitish. Hindwings pale grey; cilia grey-whitish.

Brisbane, Queensland; one specimen (Dr. A. J. Turner).

88. *P. ceraunia*, n.sp.

♂♀. 11-12 mm. Head ochreous-yellowish, face whitish. Palpi slender, whitish, second joint yellowish-tinged, terminal blackish towards apex. Antennæ white ringed with dark fuscous. Thorax orange, with obscure brassy subdorsal lines. Abdomen light orange, terminal half dark fuscous. Legs brassy-whitish, anterior tibiae and tarsi infuscated. Forewings orange; a prismatic-violet-metallic streak from base of costa to $\frac{2}{5}$ of disc, and a similar one beneath it from base of dorsum; a black line between these, a small black spot on apex of lower one, and another on dorsum at $\frac{1}{2}$; a transverse median series of six short parallel black longitudinal lines, and several others on veins about $\frac{3}{4}$; a prismatic-violet-metallic median streak from disc before middle to apex: cilia grey, round apex orange with silvery-metallic tips. Hindwings dark grey; cilia grey.

Rosewood, Queensland; in September, two specimens.

89. *P. hierarcha*, n.sp.

♂. 14 mm. Head white. Palpi slender, white, apex of terminal joint with a black lateral line. Antennæ white, ringed with dark fuscous. Thorax ferruginous, with a white dorsal stripe. Abdomen light ochreous-grey. Legs white, spotted with dark fuscous. Forewings ferruginous, lighter along costa; costal edge suffusedly whitish from $\frac{1}{3}$ to $\frac{4}{5}$; a white dorsal streak from base to $\frac{3}{4}$ of wing, attenuated posteriorly: cilia pale ochreous, round apex ferruginous, tips dark fuscous on a spot below apex. Hindwings dark grey; cilia light ochreous, purplish-tinged except towards tornus.

Brisbane, Queensland; one specimen.

90. *P. cyanogramma*, n.sp.

♂. 10-12 mm. Head and thorax ochreous-orange, with a white line on each side of back interrupted on thorax, face white. Palpi slender, white, a subapical ring of second joint and three bands of terminal joint blackish. Antennæ white, ringed with blackish, towards apex without rings but with three blackish bands. Abdomen orange-ochreous, terminal half dark fuscous. Legs

white, banded with blackish. Forewings ochreous-orange. an oblique series of several short white marks about $\frac{1}{4}$; two oblique leaden-metallic blackish-sprinkled fasciæ from costa before and beyond middle, first becoming obsolete on dorsum, edged with white anteriorly on costa and sometimes terminated beneath by whitish marks, second terminating in a leaden-metallic blackish-sprinkled subterminal streak which runs from tornus to costa before apex: cilia orange, paler towards tips, becoming purplish-fuscous towards tornus, with a dark grey costal patch before apex, and small white basal spots on middle of termen and at tornus. Hindwings dark fuscous; cilia dark fuscous, becoming light ochreous-yellowish on lower half of termen.

Sydney, New South Wales; in November and February, three specimens.

91. *P. arimaspia*, n.sp.

♀. 9-10 mm. Head, antennæ, thorax, and abdomen dark bronzy-fuscous, face shining pale greyish-ochreous. Palpi slender, ochreous-whitish, second joint with black apical ring, terminal joint with black anterior line. Legs dark fuscous, ringed with whitish. Forewings dark bronzy-fuscous; subbasal area suffused with pale ochreous or whitish-ochreous, limited by a curved somewhat oblique whitish fascia beyond $\frac{1}{4}$; whitish opposite costal and dorsal postmedian spots, nearly meeting; a smaller whitish costal spot at $\frac{4}{5}$, and sometimes a small indistinct whitish terminal spot opposite: cilia bronzy-fuscous, round apex darker, base mixed with whitish. Hindwings dark fuscous, bronzy-tinged; cilia fuscous.

Sydney, New South Wales; Launceston, Tasmania; in November and January, two specimens.

92. *P. mesoptila*, n.sp.

♀. 12 mm. Head and thorax ferruginous, face whitish. Palpi ferruginous, terminal joint with tip whitish and a subapical blackish ring. Antennæ whitish, ringed with dark fuscous. Abdomen yellow-ochreous, terminal half dark grey. Legs pale ochreous, banded with black, middle tibiæ broadly dilated with

long projecting scales. Forewings ferruginous; some black scales towards base of dorsum; a slender pale submetallic black-edged slightly curved fascia before $\frac{1}{3}$, and a straight inwardly oblique median transverse black line not quite reaching costa, space between these deeper-suffused, latter followed by submetallic subcostal and dorsal spots; a pale submetallic costal mark at $\frac{2}{3}$, followed by some black scales; a dot of black scales in disc at $\frac{2}{3}$, surrounded by a pale submetallic suffusion; a blackish dorsal mark at $\frac{3}{4}$ of wing, from which a pale submetallic terminal streak extends to apex; a black apical dot: cilia fuscous, purplish-tinged. Hindwings dark fuscous; cilia fuscous, purplish-tinged.

Brisbane, Queensland; one specimen (Dr. A. J. Turner). This species may be distinguished from all others by the dilated middle tibiae.

93. *P. anaclastis*, n.sp.

♂. 12 mm. Head and thorax light reddish-fuscous, whitish-mixed. Palpi whitish, second joint with slender indistinct reddish-fuscous basal, median, and apical rings, terminal joint with blackish subapical rings. Antennae whitish, ringed with fuscous. (Abdomen broken.) Legs whitish, anterior and middle pair ringed with dark fuscous. Forewings with expansible tuft of long hairs from near base of dorsum beneath; light reddish-fuscous; a narrow somewhat oblique white fascia at $\frac{1}{4}$, partially black-edged, indented above middle and above dorsum, followed by a pale suffusion; a triangular median blotch of blackish irroration, nearly reaching costa and dorsum, anterior side margined by a very oblique suffused whitish streak which is continued along costa to $\frac{4}{5}$; a suffused whitish streak extending along termen from tornus to apex: cilia fuscous, round apex light reddish-fuscous with a black basal line. Hindwings and cilia dark grey.

Brisbane, Queensland; one specimen (Dr. A. J. Turner).

94. *P. terminella*, Walk.

(*Gracilaria terminella*, Walk. Tin. 855.)

♂♀. 9-13 mm. Head ochreous-whitish, sometimes tinged with brown-reddish. Palpi whitish, basal and median bands of second

joint, and subbasal, median, and subapical rings of terminal joint dark fuscous. Antennæ whitish, ringed with blackish, with three blackish bands towards apex. Thorax whitish-ochreous mixed with reddish-fuscous. Abdomen rather dark fuscous. Legs whitish-ochreous, banded with dark fuscous. Forewings pale brown-reddish, somewhat mixed with whitish-ochreous, irregularly sprinkled with blackish; a dark brown suffusion extending throughout disc and towards anterior half of costa; a narrow straight oblique pale or whitish fascia at $\frac{1}{4}$, black-edged on lower half anteriorly, and on a subcostal dot posteriorly; a narrow inwardly oblique pale or whitish median fascia, posteriorly blackish-edged in disc; sometimes a whitish suffusion towards costa posteriorly; a wedge-shaped blackish mark at tornus, sometimes preceded by a whitish suffusion: cilia fuscous, round apex light brown-reddish with a black basal suffusion, and a black line on tips beneath apex. Hindwings grey, darker posteriorly; cilia fuscous.

Rosewood, Queensland; Newcastle and Sydney, New South Wales; from August to February, common.

95. *P. pyrrhodes*, n.sp.

♀. 10-11 mm. Head and thorax light reddish-fuscous mixed with whitish-ochreous, face ochreous-whitish. Palpi whitish, second joint with basal and subapical fuscous rings, terminal joint with black basal and subapical rings and a black anterior line in middle. Antennæ whitish, ringed with blackish. Abdomen shining grey. Legs whitish, ringed with black. Forewings pale reddish-fuscous, sprinkled with whitish and black towards costa posteriorly; a narrow straight oblique whitish fascia at $\frac{1}{4}$, not reaching dorsum, blackish-edged anteriorly; normal stigmata formed by spots of black irroration, plical at $\frac{1}{2}$, first discal rather obliquely before plical: cilia fuscous, round apex light reddish-fuscous, mixed with black above apex, and with a few black points towards base below apex. Hindwings dark grey; cilia fuscous.

Geraldton, West Australia; in November, two specimens.

96. *P. sphenosema*, n.sp.

♀. 9 mm. Head and thorax pale ochreous, with a fuscous spot on crown. Palpi whitish, subapical band of second joint, and base of terminal joint blackish. Antennæ whitish, ringed with blackish. Abdomen fuscous. Legs whitish, ringed with blackish. Forewings pale brownish-ochreous, suffused with brown posteriorly; a short oblique blackish mark from base of costa; very oblique ochreous-whitish wedge-shaped marks from costa at $\frac{1}{4}$, beyond middle, and at $\frac{4}{5}$, first edged anteriorly with blackish suffusion, space between first and second wholly suffused with blackish, second and third edged posteriorly with blackish suffusion; a suffused blackish streak on fold from near base to middle, interrupted with whitish-ochreous at $\frac{2}{5}$, a longitudinal streak of blackish suffusion in disc from middle to $\frac{4}{5}$; suffused blackish dorsal spots near base and at $\frac{1}{3}$; a small triangular ochreous-white posteriorly black-edged costal spot before apex: cilia light fuscous, with a black median hook at apex, limiting a circular spot of which upper half is ochreous-brown, lower half black, separated by a whitish bar. Hindwings grey; cilia light grey.

Toowoomba (2000 feet), Queensland; in December, one specimen.

97. *P. charisia*, n.sp.

♂♀. 8-10 mm. Head white, centre of crown more or less ochreous-tinged. Palpi white, second joint ochreous-tinged. Antennæ white, fuscous-ringed. Thorax ochreous, with a broad white dorsal stripe. Abdomen whitish-ochreous, terminal half grey, in ♂ with rather large lateral expansible hair-pencils from base. Legs whitish, ringed with dark grey. Forewings in ♂ with expansible tuft of long hairs from near base of dorsum beneath; brownish-ochreous, sometimes sprinkled with dark fuscous; a rather thick white streak below costa from base to middle; plical (placed at $\frac{1}{2}$) and second discal stigmata elongate, dark fuscous, enclosed and connected by two sinuate white streaks, upper edged with dark fuscous above; a small white costal spot near apex, followed by a dark fuscous suffusion; a slender white

streak along termen from tornus to apex : cilia fuscous, beneath apex with cloudy basal and median dark fuscous lines separated by a white line. Hindwings grey ; cilia pale grey, yellowish-tinged.

Rosewood and Brisbane, Queensland ; Sydney, New South Wales ; in September, October, and March, three specimens.

98. *P. promacha*, n.sp.

♂. 10 mm. Head whitish-ochreous. Palpi whitish-ochreous, terminal joint with dark fuscous anterior line. Antennæ ochreous-whitish. Thorax dark fuscous, with whitish-ochreous subdorsal stripes. Abdomen fuscous. Legs ochreous-whitish, anterior pair dark fuscous, middle and posterior pair banded with fuscous. Forewings dark fuscous ; a rather thick whitish-ochreous dorsal streak from base to tornus, attenuated posteriorly ; a whitish-ochreous costal spot at $\frac{3}{4}$: cilia pale greyish-ochreous, with a dark fuscous apical bar, beneath apex base mixed with dark fuscous. Hindwings light grey ; cilia pale greyish-ochreous.

Sydney, New South Wales ; in March, one specimen taken at light ; it rested with the antennæ directly porrected as in *Coleophora*, a peculiarity not observed in any other species of the genus.

99. *P. oxysema*, n.sp.

♂. 8-9 mm. Head, palpi, and antennæ yellowish-white. Thorax dark fuscous, with a broad yellowish-white dorsal stripe. Abdomen shining grey. Legs white, banded with dark fuscous, anterior pair wholly dark fuscous. Forewings dark bronzy-fuscous ; markings yellowish-white ; a rather thick dorsal streak from base to tornus ; a rather large costal spot beyond middle, and another at $\frac{4}{5}$; a small terminal spot above tornus : cilia whitish, with a dark fuscous apical bar, beneath apex with cloudy blackish basal and median lines, towards tornus becoming whitish-fuscous. Hindwings grey ; cilia whitish-grey, yellowish-tinged.

Rosewood, Queensland ; Newcastle, Sydney, and Cooma, New South Wales ; in September, January, and February, five specimens.

100. *P. oxytoma*, n.sp.

♂♀. 9-11 mm. Head white, with a bronzy-fuscous stripe on crown. Palpi white, second joint with black apical and submedian bands, terminal joint with black anterior line. Antennæ dark fuscous, apical third ochreous-whitish. Thorax dark bronzy-fuscous, with white subdorsal stripes. Abdomen dark fuscous, in ♂ towards apex grey-whitish, with large lateral expansible blackish hair-pencils from base; in ♀ ochreous towards base. Legs whitish, banded with blackish. Forewings bronzy-fuscous, suffused with dark fuscous on fold, a longitudinal streak in disc posteriorly, and margins of markings; markings shining white; a short streak from base along fold; a very oblique wedge-shaped mark from $\frac{1}{4}$ of costa, reaching half across wing; a rather large subtriangular spot on middle of costa, a smaller one at $\frac{3}{4}$, and three strigulae beyond this in cilia, last apical; a streak along dorsum from base to tornus, sometimes interrupted before tornus; an ill-defined dot in disc at $\frac{2}{3}$, and one on termen above tornus: cilia whitish-fuscous, beneath apex whitish on apical half, round apex with three blackish lines. Hindwings grey; cilia pale fuscous.

Sydney, Blackheath (3500 feet), and Bathurst (2000 feet), New South Wales; Healesville, Victoria; Deloraine and Hobart, Tasmania; from September to December, thirteen specimens.

101. *P. tetradema*, n.sp.

♂♀. 7-8 mm. Head shining grey, face whitish. Palpi whitish, irrorated with dark grey except towards base. Antennæ dark fuscous. Thorax and abdomen dark bronzy-grey. Legs whitish, banded with blackish. Forewings dark bronzy-fuscous; four equidistant straight vertical bronzy-metallic or leaden-metallic fasciæ, fourth forming a white spot on costa; a black longitudinal streak in posterior half of disc, interrupted by third and fourth fasciæ: cilia grey, round apex dark grey irrorated with pale. Hindwings dark fuscous, bronzy-shining; cilia fuscous.

Geraldton and Carnarvon, West Australia; in October and November, twelve specimens.

102. *P. argyrostrepta*, n.sp.

♂♀. 8-9 mm. Head and thorax dark bronzy-fuscous. Palpi dark fuscous, terminal joint whitish with dark fuscous lateral lines. Antennæ white, ringed with dark fuscous except on apical third. Abdomen dark grey, in ♂ with long lateral expansible blackish hair-pencils from base. Legs dark fuscous, ringed with whitish. Forewings dark bronzy-fuscous; four slender pale golden-metallic fasciæ, first at $\frac{1}{4}$, oblique, others vertical, third not reaching costa, interrupted below middle; a pale golden-metallic apical spot: cilia fuscous, on costa and round apex dark fuscous, with a white costal spot on fourth fascia. Hindwings dark fuscous; cilia fuscous.

Sydney, New South Wales; in October and March, nine specimens, all taken at light.

103. *P. bathrosema*, n.sp.

♂. 7 mm. Head and thorax white, somewhat sprinkled with fuscous. Palpi white, second joint blackish except apex, terminal joint with blackish subbasal and apical rings. Antennæ white, ringed with dark fuscous. (Abdomen broken.) Legs white, ringed with blackish. Forewings fuscous, suffusedly irrorated with dark fuscous; a thick white median streak from base to near $\frac{1}{3}$; a small white costal spot at $\frac{1}{4}$, and one on dorsum opposite; a nearly straight white median fascia, enclosing a dark fuscous dot in middle; two rather large opposite white costal and dorsal spots at $\frac{3}{4}$; a small white apical spot: cilia whitish-fuscous (imperfect). Hindwings pale grey; cilia whitish-fuscous.

Brisbane, Queensland; in September, one specimen.

104. *P. trivincta*, n.sp.

♀. 8-10 mm. Head fuscous, face whitish. Palpi white, basal band and apical ring of second joint black. Antennæ whitish, ringed with dark fuscous. Thorax and abdomen dark fuscous. Legs dark fuscous, ringed with white. Forewings dark fuscous, purplish-tinged; a slightly curved rather oblique white fascia at

$\frac{1}{4}$; white costal and dorsal spots somewhat obliquely placed beyond middle; a white costal spot at $\frac{4}{5}$, and sometimes a white terminal dot opposite it: cilia fuscous, round apex mixed with dark fuscous, with a white basal spot at apex. Hindwings and cilia fuscous.

Sydney, New South Wales; in October, February, and March, five specimens.

105. *P. nesophora*, n.sp.

♂♀. 9-11 mm. Head white, crown somewhat fuscous-sprinkled. Palpi whitish, second joint with basal band and subapical ring, terminal joint with basal and apical rings dark fuscous, sometimes ill-defined. Antennæ whitish; ringed with dark fuscous. Thorax dark fuscous, apex of patagia and a posterior dorsal dot whitish. Abdomen grey, in ♂ with lateral ochreous-whitish expansible hair-pencils from base. Legs dark fuscous, ringed with white. Forewings dark fuscous, bronzy-tinged, sometimes paler-mixed; a white basal dot; a somewhat oblique white fascia at $\frac{1}{4}$, not reaching dorsum; a vertical white median fascia, usually not quite reaching dorsum, enclosing a dark fuscous central dot; rather large white opposite costal and dorsal spots at $\frac{3}{4}$, almost or quite meeting; a white apical dot: cilia fuscous, round apex mixed with dark fuscous on basal half. Hindwings and cilia grey.

Sydney, New South Wales; Healesville and Gisborne, Victoria; Mount Lofty, South Australia; from October to December, and in February, seven specimens.

106. *P. bryomima*, n.sp.

♂♀. 7-8 mm. Head whitish, sprinkled with blackish on crown. Palpi whitish, second joint with a subapical ring and basal half blackish, terminal joint sprinkled with dark fuscous. Antennæ whitish, ringed with dark fuscous. Thorax whitish-ochreous, anterior edge irrorated with dark fuscous. Abdomen pale shining grey, in ♂ with whitish expansible lateral hair-pencils from base. Legs blackish, ringed with white. Forewings dark bronzy-fuscous irrorated with blackish; a basal whitish-ochreous dot; a broad pale ochreous fascia near base, posterior edge white, somewhat curved; a median white fascia irrorated with grey, broadly

dilated downwards so that anterior edge is very oblique and touches preceding fascia on dorsum, enclosing black plical and first discal stigmata, placed vertically; a white fascia at $\frac{2}{4}$, more or less grey-sprinkled towards dorsum, narrowed in middle, enclosing blackish second discal stigma; a whitish apical dot: cilia light grey, round apex mixed with black on basal half. Hindwings grey; cilia light grey.

Sydney, New South Wales; in October and November, ten specimens. Larva elongate, cylindrical, with scattered whitish hairs; ochreous-whitish; head, a plate on 2, and another on 13 brownish-ochreous: feeds on foliaceous lichens, burrowing beneath them, on tree-trunks, in September and October. Pupa in an elongate flattened cocoon covered with lichen-dust, exposed on trunk.

107. *P. pileata*, n.sp.

♂♀. 7-10 mm. Head white. Palpi white, towards base dark fuscous. Antennæ, thorax, abdomen, and legs dark fuscous, tarsi ringed with whitish. Forewings dark fuscous; three narrow whitish fasciæ, tending to be interrupted in middle, first at $\frac{1}{4}$, second at $\frac{1}{2}$, both slightly curved, third at $\frac{3}{4}$, straight: cilia fuscous, with a dark fuscous median line, a white basal dot at apex, tips white above this. Hindwings dark fuscous; cilia fuscous.

Sydney, New South Wales; in October and December, three specimens.

108. *P. anarithma*, Meyr.

(*Proterocosma anarithma*, Meyr., Trans. N. Zeal. Inst. 1888, 175.)

♂♀. 7-10 mm. Head and thorax brownish-ochreous, face ochreous-whitish. Palpi ochreous-whitish, second joint with basal half and subapical ring irrorated with blackish, terminal joint irrorated with dark fuscous. Antennæ whitish-ochreous, ringed with dark fuscous. Abdomen grey-whitish or grey. Legs dark grey, ringed with whitish. Forewings brownish-ochreous, sometimes sprinkled with dark fuscous; black dots on base of costa and

dorsum, sometimes obsolete, a third on costa near base, and a fourth in disc beneath third; stigmata rather large, black, plical somewhat before middle, first discal rather obliquely before plical; an indistinct whitish-ochreous costal spot at $\frac{4}{5}$, and sometimes one on termen opposite: cilia light greyish-ochreous, round apex sometimes sprinkled with dark fuscous. Hindwings grey; cilia pale ochreous-grey.

Bathurst (2000 feet), New South Wales; Deloraine and Georges Bay, Tasmania; Mount Gambier, South Australia; Albany, West Australia; common also in the North Island of New Zealand; from September to March, local, but usually abundant where it occurs.

109. *P. eumelaena*, n.sp.

♀. 13 mm. Head, palpi, antennæ, thorax, abdomen, and legs shining dark fuscous. Forewings rather broad, shining dark bronzy-fuscous: cilia shining dark fuscous, towards tornus lighter. Hindwings fuscous, darker posteriorly; cilia fuscous.

Adelaide, South Australia; in November, one specimen.

110. *P. semnostola*, n.sp.

♂♀. 8-12. Head, palpi, antennæ, thorax, and legs dark fuscous. Abdomen fuscous. Forewings dark fuscous; stigmata darker, indistinct, plical at $\frac{2}{5}$, first discal obliquely beyond plical: cilia fuscous, round apex dark fuscous. Hindwings and cilia fuscous.

Sydney, New South Wales; Campbelltown, Tasmania; Port Lincoln, South Australia; from June to December, ten specimens. Larva moderate, cylindrical; pinkish-fuscous, 13 dark fuscous; head black; 2 black except anterior margin: feeds amongst spun leaflets of *Acacia decurrens*, forming an elongate three-sided chamber with silk, in August.

111. *P. exodroma*, n.sp.

♂♀. 7-9 mm. Head, palpi, and thorax brownish-ochreous, irrorated or suffused with dark fuscous except face. Antennæ fuscous. Abdomen light brownish-ochreous. Legs dark fuscous, ringed with whitish-ochreous. Forewings pale brownish-ochreous,

irregularly irrorated with dark fuscous; a straight-edged dark fuscous or blackish basal fascia; stigmata rather large, blackish, plical at $\frac{2}{3}$, first discal obliquely beyond plical; in one specimen the first discal stigma becomes a dark fuscous blotch extending to costa; sometimes a cloudy dark fuscous spot near dorsum before tornus; obscure whitish-ochreous opposite costal and dorsal spots at $\frac{4}{5}$; cilia fuscous or greyish-ochreous, round apex mixed with dark fuscous. Hindwings grey; cilia fuscous or light greyish-ochreous.

Toowoomba (2000 feet), Queensland; Sydney, New South Wales; Adelaide, Wirrabara, and Port Lincoln, South Australia; from September to December, fourteen specimens. Larva feeds amongst spun leaflets of *Acacia decurrens*, in August.

16. GLAPHYRISTIS, n.g.

Antennæ almost 1, in ♂ simple, sinuate and swollen above basal joint. Labial palpi very long, recurved, slender, smooth, terminal joint longer than second, acute. Thorax in ♂ with long dense expansible lateral hair-pencils from beneath hindwings, lying along abdomen. Posterior tibiæ rough-haired. Forewings: 1b furcate, 7 and 8 stalked, 7 to costa. Hindwings $\frac{2}{3}$, elongate-lanceolate, cilia 4; veins all separate.

Based on the following species only; it is quite intermediate in character between *Limnoecia* and *Pyroderces*. Imago with forewings lanceolate; eyes crimson during life.

112. *G. marmurea*, n.sp.

♂♀. 12-14 mm. Head and thorax light ochreous-brown, face shining whitish-ochreous. Palpi brassy-whitish, somewhat brown-sprinkled. Antennæ whitish-ochreous, ringed with fuscous. Abdomen light ochreous-orange, sides and apex dark fuscous, basal hair-pencils of ♂ light yellow-ochreous. Legs whitish, obscurely ringed with dark grey. Forewings shining light ochreous-brown, somewhat deeper posteriorly; a white costal

streak from middle to near apex : cilia fuscous, tips of costal cilia white before apex. Hindwings and cilia dark fuscous.

Sydney, New South Wales ; from November to March, eight specimens.

17. OTONOMA, n.g.

Antennæ $\frac{4}{5}$, in ♂ shortly ciliated, above basal joint with slight sinuation and notch, beneath which is a long slender chitinous projection. Labial palpi long, recurved, second joint rough-scaled beneath, terminal shorter, acute. Posterior tibiæ rough-haired. Forewings : 1b simple, 6 absent, 7 and 8 stalked, 7 to costa. Hindwings $\frac{2}{3}$, lanceolate, cilia $2\frac{1}{2}$; all veins separate.

Includes only the one species; a development of *Limnoecia*. Imago with forewings lanceolate.

113. *O. anemois*, n.sp.

♂. 9-10 mm. Head and thorax whitish-ochreous, somewhat fuscous-sprinkled. Palpi ochreous-whitish, a subapical band of second joint, and base and a median band of terminal joint blackish. Antennæ whitish, ringed with fuscous. Abdomen dark fuscous. Legs white, banded with dark fuscous. Forewings light brown; a broad suffusion along costa, a suffused streak along fold from base to middle, another in disc from middle to termen, and a suffused dorsal spot before middle dark fuscous; four irregular oblique white fasciæ from costa, reaching about $\frac{3}{4}$ across wing, and small indistinct white dorsal spots opposite their costal extremities; a triangular white costal spot at $\frac{5}{16}$, and a smaller one on termen opposite : cilia whitish, towards tornus fuscous-tinged, round apex with a median black line, on basal half with spots of fuscous irroration. Hindwings grey; cilia grey-whitish.

Sydney, New South Wales; in March, two specimens at light.

18. LIMNOECIA, Staint.

Antennæ $\frac{4}{5}$, in ♂ shortly ciliated. Labial palpi very long, recurved, second joint rough-scaled or shortly tufted or nearly smooth beneath, terminal joint longer, acute. Posterior tibiæ rough-haired. Forewings : 1b furcate, 7 and 8 stalked, 7 to costa. Hindwings $\frac{2}{3}$, elongate-lanceolate, cilia 2-3; all veins separate.

As in the case of *Pyroderces*, I have extended this genus to include forms differing considerably in the scaling of the palpi, but in other respects nearly related together; hence *Ptilocharis*, Meyr., is reduced to a synonym. It is characteristically Australian, though one species has now a very wide distribution. Imago with forewings elongate, long-pointed; often retired in habit.

1. Forewings with whitish markings from costa.....	2.	
Forewings without whitish markings from costa....	16.	
2. Forewings with one or more entire whitish fasciæ..	3.	
Forewings without entire fascia.....	13.	
3. Second joint of palpi with triangular scale-projection beneath	4.	
Second joint of palpi at most rough-scaled beneath	5.	
4. First fascia entire.....	121.	<i>charactis</i> .
First fascia not reaching dorsum....	127.	<i>camptosema</i> .
5. Forewings whitish-ochreous mixed with fuscous....	6.	
Forewings fuscous or dark fuscous.....	7.	
6. Median fascia entire.....	119.	<i>leptomeris</i> .
Median fascia obsolete dorsally....	118.	<i>hemidoma</i> .
7. Head and thorax wholly dark fuscous.....	130.	<i>viastis</i> .
Head and thorax not wholly dark fuscous.....	8.	
8. Head and thorax mixed with dark fuscous.....	122.	<i>ochrozona</i> .
Head and thorax wholly white or whitish-ochreous	9.	
9. Thorax wholly white.....	10.	
Thorax more or less fuscous.....	11.	
10. Abdomen yellow-ochreous.....	120.	<i>isozona</i> .
Abdomen light grey.....	123.	<i>cybophora</i> .
11. First fascia broadly dilated downwards.....	117.	<i>epimictis</i> .
First fascia not dilated downwards.....	12.	
12. Forewings with whitish discal dot at $\frac{3}{4}$	116.	<i>trisema</i> .
Forewings without whitish discal dot..	124.	<i>callimitris</i> .
13. Forewings with white dorsal spot at $\frac{1}{4}$	128.	<i>tetraplanetis</i> .
Forewings without such spot.....	14.	
14. Two anterior fasciæ not reaching half across wing	115.	<i>syntaracta</i> .
Two anterior fasciæ reaching more than half across wing.....	15.	
15. Two anterior fasciæ parallel.....	125.	<i>chionospila</i> .
Two anterior fasciæ converging downwards.....	126.	<i>scoliosema</i> .
16. Forewings blackish, with yellow spots.....	129.	<i>chrysonesa</i> .
Forewings pale ochreous.....	114.	<i>phragmitella</i> .

114. *L. phragmitella*, Staint.

(*Limnoecia phragmitella*, Staint., Cat. Suppl. 4; Meyr., Trans. N. Zeal. Inst. 1888, 173.)

♂♀. 15-21 mm. Head and thorax pale ochreous. Palpi whitish-ochreous, terminal joint with a dark fuscous line. Forewings whitish-ochreous, brownish-tinged, with some fuscous scales; discal stigmata dark fuscous, partly whitish-edged and connected by a whitish streak; dark fuscous marginal dots towards apex. Hindwings light grey, ochreous-tinged.

Sydney, New South Wales; in January, one specimen. Occurs also in New Zealand, Europe, North Africa, and very probably generally throughout the Old World, its habits being so retired as to escape notice, and the foodplant quite cosmopolitan. Larva yellow-whitish, with five brownish longitudinal lines; feeding in seedheads of *Typha angustifolia*, burrowing amongst the seeds and causing the down to hang out in loose masses; *Scieropepla typhicola* acts in quite the same manner. The wide distribution of this insect is probably quite natural, transmission being effected in the egg state by the light down of the foodplant, borne by the wind.

115. *L. syntaracta*, n.sp.

♀. 10-12 mm. Head and thorax light brown mixed with whitish-ochreous and dark fuscous, face ochreous-whitish. Palpi whitish, second joint somewhat roughened beneath, subbasal and subapical bands of second joint, and basal, median, and subapical bands of terminal joint blackish. Antennæ ochreous-whitish, ringed with blackish. Abdomen dark fuscous. Legs dark fuscous, ringed with whitish. Forewings brown, irregularly irrorated with ochreous-whitish and blackish; fine oblique white streaks from costa at $\frac{1}{4}$ and $\frac{1}{2}$, not reaching half across wing; stigmata dark fuscous, plical at $\frac{1}{2}$, indistinct, first discal above plical, well-marked, second ill-defined, a suffused dark fuscous streak between discal stigmata; a short oblique whitish streak from tornus; an irregular whitish spot on costa at $\frac{5}{6}$; cilia fuscous, round apex mixed with darker, base spotted with whitish and dark fuscous. Hindwings and cilia fuscous.

Brisbane and Toowoomba (2000 feet), Queensland; Sydney, New South Wales; in September, and from December to February, four specimens.

116. *L. trisema*, n.sp.

♂♀. 14-17 mm. Head whitish-ochreous. Palpi ochreous-whitish, second joint rough-scaled beneath; basal half and subapical ring of second joint, and basal and subapical bands of terminal joint blackish. Antennæ ochreous-whitish, obscurely ringed with dark fuscous. Thorax whitish-ochreous mixed with fuscous. Abdomen fuscous. Legs dark fuscous, ringed with ochreous-whitish. Forewings fuscous, irrorated with darker, in disc lighter and ochreous-tinged; a rather oblique whitish fascia at $\frac{1}{8}$, edged anteriorly with blackish-fuscous, attenuated below middle, obsolete on dorsum; a slender irregular partially obsolete whitish vertical median fascia, dilated and suffused on costa; costal half of wing between these two fasciæ suffused with dark fuscous, lower edge straight, blackish, and margined by a pale streak; a suffused blackish discal streak from $\frac{1}{2}$ to $\frac{3}{4}$, on which is a whitish dot at $\frac{2}{3}$; a rather large whitish costal spot at $\frac{4}{5}$, and a small one on termen opposite: cilia whitish-fuscous, round apex darker-mixed. Hindwings grey; cilia whitish-grey.

Hobart, Tasmania; in December, three specimens.

117. *L. epimictis*, n.sp.

♂♀. 13-14 mm. Head ochreous-whitish. Palpi whitish, second joint rough-scaled beneath, basal half and subapical ring of second joint, and basal and subapical bands of terminal joint blackish. Antennæ whitish, ringed with dark fuscous. Thorax whitish-ochreous mixed with dark fuscous. Abdomen ochreous-yellowish, in ♀ much suffused with dark fuscous. Legs dark fuscous, ringed with whitish. Forewings dark fuscous; three whitish fasciæ, ochreous-tinged and sprinkled with fuscous except towards costa, especially in ♀, first from costa before $\frac{1}{4}$, broadly dilated downwards, posterior edge very oblique, enclosing a dark fuscous dorsal suffusion, second median, rather broad, irregular, more or less interrupted in disc, third at $\frac{4}{5}$, interrupted to form rather large

subquadrate costal and dorsal spots, latter in ♀ connected on dorsum with preceding fascia: cilia pale yellow-ochreous, becoming fuscous towards tornus, above apex and on basal half below apex mixed with dark fuscous. Hindwings grey, posteriorly darker; cilia grey, in ♂ paler and yellowish-tinged towards tornus.

Healesville, Victoria; in December, two specimens.

118. *L. hemidoma*, n.sp.

♂♀. 8-9 mm. Head and thorax white, with a few dark fuscous scales. Palpi white, second joint somewhat rough beneath, basal half and subapical ring of second joint, and basal and subapical rings of terminal joint black. Antennæ white, ringed with black. Abdomen grey. Legs white, banded with dark fuscous. Forewings whitish-ochreous, more or less sprinkled with fuscous; a rather oblique white fascia at $\frac{1}{4}$, edged anteriorly by a blackish streak usually not reaching dorsum but extended on costa to base; a white hardly oblique median fascia, obsolete dorsally, edged anteriorly on costal half by a blackish trapezoidal blotch; sometimes an elongate blackish subdorsal dot beyond middle; an elongate black mark in disc at $\frac{2}{3}$; a narrow white fascia at $\frac{1}{3}$, dilated towards costa; a blackish elongate suffusion between this and apex: cilia whitish, towards tornus greyish-tinged, round apex sprinkled with dark fuscous towards base, with a blackish median line. Hindwings grey; cilia whitish-grey.

Albany, West Australia; in December, eight specimens.

119. *L. leptomeris*, n.sp.

♂♀. 7-10 mm. Head and thorax whitish, shoulders with a blackish spot. Palpi white, second joint somewhat rough beneath, basal half and subapical ring of second joint, and basal and subapical rings of terminal joint black. Antennæ white, ringed with dark fuscous, towards apex with about six broader dark rings. Abdomen shining grey, in ♂ with whitish-ochreous lateral hair-pencils from base. Legs white, banded with blackish. Forewings pale ochreous sprinkled with dark fuscous; an oblique white fascia at $\frac{1}{4}$, edged anteriorly by a blackish streak sometimes not reaching

dorsum but extended on costa to base; a white rather oblique median fascia, edged anteriorly with blackish, on costal half by a blackish trapezoidal blotch; a white fascia at $\frac{1}{3}$, sometimes interrupted in middle, edged anteriorly by a trapezoidal blackish costal blotch; apical area variably suffused with white or blackish: cilia whitish, towards tornus whitish-fuscous, round apex sprinkled with dark fuscous. Hindwings grey; cilia whitish-grey.

Rosewood, Queensland; Sydney, New South Wales; Melbourne, Victoria; Campbelltown, Tasmania; from September to December, and in March and April, twelve specimens.

120. *L. isozona*, n.sp.

♂♀. 10-12 mm. Head and thorax ochreous-white. Palpi white, second joint rough-scaled beneath, basal half and subapical ring of second joint, base and subapical ring of terminal joint black. Antennæ whitish, ringed with dark fuscous, with a dark fuscous band at $\frac{2}{3}$. Abdomen yellow-ochreous, posteriorly and on sides grey. Legs whitish, banded with dark fuscous. Forewings blackish-fuscous; a whitish-ochreous suffusion on base of dorsum; two broad rather oblique ochreous-white fasciæ edged with clear white, first at $\frac{1}{4}$, second median; a white spot on costa at $\frac{1}{3}$, and an ochreous-white spot on termen opposite, connected along dorsum with second fascia: cilia ochreous-whitish, towards tornus whitish-fuscous, round apex sprinkled with dark fuscous. Hindwings grey; cilia whitish-fuscous.

Toowoomba (2000 feet), Queensland; Sydney, New South Wales; in September, December, and April, four specimens.

121. *L. charactis*, n.sp.

♀. 23 mm. Head and thorax ochreous-whitish. Palpi ochreous-whitish, second joint with scales forming a broad triangular projection beneath towards apex, basal half of second joint, and basal and subapical rings of terminal joint dark fuscous. Antennæ ochreous-whitish, ringed with dark fuscous. Abdomen whitish-fuscous. Legs whitish, banded with dark fuscous. Forewings light fuscous mixed with dark fuscous; a blackish spot on

base of costa, and a blotch on base of dorsum, extending to a broad rather oblique ochreous-whitish fascia at $\frac{1}{4}$; a large subquadrate ochreous-whitish spot somewhat before middle of costa, and an oblique spot on dorsum rather beyond it; rather large ochreous-whitish opposite costal and dorsal spots at $\frac{3}{4}$; a broad blackish-fuscous suffused streak in disc from $\frac{1}{3}$ to apex: cilia whitish, towards tornus light fuscous, basal half mixed with light fuscous. Hindwings fuscous, darker posteriorly; cilia light fuscous.

Gisborne, Victoria, in March; one specimen received from Mr. G. Lyell.

122. *L. ochrozona*, n.sp.

♂♀. 10-12 mm. Head whitish-ochreous, middle of crown mixed with dark fuscous. Palpi whitish-ochreous, basal half and subapical ring of second joint, and suffused irroration of terminal joint dark fuscous (in ♀ almost spotless). Antennæ in ♂ dark fuscous, apical third and a band above base ochreous-whitish (in ♀ ochreous-whitish ringed with fuscous). Thorax whitish-ochreous, mixed with dark fuscous on back. Abdomen light fuscous (in ♀ whitish-ochreous). Legs dark fuscous ringed with whitish. Forewings dark fuscous, purplish-tinged; extreme base whitish-ochreous; three moderate irregular-edged whitish-ochreous fasciae, first at $\frac{1}{4}$, somewhat oblique, second median, vertical, third at $\frac{3}{4}$, vertical, interrupted in middle; a whitish-ochreous discal dot at $\frac{2}{3}$: cilia whitish-ochreous, towards tornus pale fuscous, basal half round apex mixed with dark fuscous. Hindwings fuscous (in ♀ pale grey); cilia light fuscous.

Mittagong (3000 feet), New South Wales, in March, one ♂; Wirrabara, South Australia, in October, one ♀, probably identical.

123. *L. cybophora*, n.sp.

♂♀. 12-13 mm. Head and thorax white. Palpi white, basal half of second joint dark fuscous. Antennæ whitish, with dark fuscous bands above base and above middle, and several dark fuscous rings towards apex. Abdomen light grey. Legs white, banded with dark fuscous. Forewings dark fuscous, coppery-

tinged; white fasciæ at $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{3}{4}$, first and second broad, nearly vertical, not quite reaching dorsum, third moderate, irregular, vertical: cilia pale fuscous, round apex with basal half mixed with dark fuscous, with a white apical dot, terminal half whitish. Hindwings grey; cilia pale fuscous.

Sydney, New South Wales; Melbourne, Victoria; in October and April, two specimens.

124. *L. callimitris*, n.sp.

♂. 11 mm. Head white. Palpi white, basal half of second joint blackish. Antennæ dark fuscous, apical $\frac{1}{8}$ whitish. Thorax dark fuscous, apex of patagia white. Abdomen dark fuscous. Legs dark fuscous, ringed with white. Forewings blackish-fuscous, coppery-tinged; a narrow white basal mark; three rather narrow white fasciæ at $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{3}{4}$, first and second slightly oblique, not quite reaching dorsum, third vertical, nearly interrupted in middle: cilia fuscous, round apex with basal half mixed with dark fuscous, with a whitish apical dot, terminal half obscurely whitish. Hindwings and cilia fuscous.

Ben Lomond (4500 feet), New South Wales; in December, one specimen.

125. *L. chionospila*, n.sp.

♂♀. 17-21 mm. Head ochreous-whitish, back of crown blackish-fuscous. Palpi ochreous-whitish, basal $\frac{1}{4}$ of second joint, and median band of terminal joint dark fuscous. Antennæ dark fuscous, with bands of obscure whitish rings above base and below middle, and a broad ochreous-whitish band immediately before apex. Thorax blackish-fuscous. Abdomen fuscous, towards base light yellow-ochreous. Legs whitish, banded with dark fuscous. Forewings blackish-fuscous; a dark ashy-grey streak along dorsum; rather narrow ochreous-white slightly oblique fasciæ at $\frac{1}{4}$ and $\frac{1}{2}$, pointed beneath, anterior edge convex, not crossing dorsal streak; an ochreous-white inwardly oblique spot on costa at $\frac{3}{4}$, and a whitish terminal dot opposite; an ochreous-white apical spot or dot: cilia fuscous, round apex mixed with

dark fuscous, with a rather broad white apical bar. Hindwings and cilia fuscous.

Sydney, New South Wales; from September to November, three specimens.

126. *L. scoliosema*, n.sp.

♂♀. 15-16 mm. Head ochreous-whitish or pale yellow-ochreous. Palpi ochreous-whitish, second joint with short triangular projecting tuft of scales beneath towards apex, basal half blackish, terminal joint unusually long, more or less suffused with blackish. Antennæ whitish, ringed with dark fuscous, towards apex with several broader dark fuscous rings. Thorax blackish-fuscous, posterior extremity ochreous-whitish. Abdomen dark grey, in ♀ with an ochreous-yellowish suffusion before middle. Legs blackish-fuscous, ringed with ochreous-whitish. Forewings blackish-fuscous, purplish-tinged; two narrow ochreous-white fasciæ at $\frac{1}{3}$ and $\frac{1}{2}$, not reaching dorsum, first very oblique, curved inwards, second vertical, posterior edge deeply indented in disc; a semicircular ochreous-white costal spot at $\frac{4}{5}$, and a small terminal ochreous-white mark opposite: cilia fuscous or whitish-fuscous, round apex dark fuscous with basal line and terminal half whitish. Hindwings and cilia fuscous.

Melbourne, Victoria; Mount Lofty, South Australia; Albany, West Australia; in December, three specimens.

127. *L. camptosema*, n.sp.

♂. 15-16 mm. Head white. Palpi whitish, second joint with short triangular tuft of projecting scales beneath, basal third dark fuscous, a subapical ring of second joint, and basal and median rings of terminal joint fuscous-sprinkled, terminal joint more rough-scaled than usual. Antennæ whitish, ringed with blackish. Thorax ochreous-white, patagia more ochreous-tinged. Abdomen yellow-ochreous, posteriorly light grey. Legs whitish, banded with dark grey. Forewings dark fuscous, coppery-tinged; two moderate rather oblique ochreous-white fasciæ at $\frac{1}{3}$ and before middle, first reaching $\frac{2}{3}$ across wing, second prominent on both margins in middle, nearly reaching dorsum; a narrow ochreous-

white fascia at $\frac{4}{5}$, angulated inwards in middle: cilia fuscous, round apex dark fuscous, with an apical dot at base and terminal half whitish. Hindwings and cilia fuscous.

Melbourne, Victoria; two specimens received from Rev. G. H. Raynor. *Pogonias trissodesma*, Low., Trans. Roy. Soc. S. Austr. 1894, 108, is probably an allied species of this genus, but I have not seen a specimen, and do not venture to include it.

128. *L. tetraplanetis*, n.sp.

♂♀ 10-11 mm. Head white. Palpi white, second joint smooth, terminal joint with dark fuscous median ring. Antennæ, thorax, and abdomen dark fuscous. Legs blackish, ringed with white. Forewings blackish-fuscous, purplish-tinged; four moderately large ochreous-white spots, first largest, semicircular, on dorsum at $\frac{1}{4}$, second subquadrate, on costa before middle, third semicircular, on dorsum before tornus, fourth suboval, rather inwardly oblique, on costa at $\frac{3}{4}$: cilia dark fuscous. Hindwings and cilia fuscous.

Brisbane, Queensland; two specimens received from Mr. G. Barnard.

129. *L. chrysonesa*, n.sp.

♂. 16 mm. Head and palpi mostly orange. Abdomen blackish. Forewings purple-black; a roundish yellow spot extending across wing near base but not quite reaching costa; a small irregular yellow spot in disc at about $\frac{2}{3}$: cilia blackish. Hindwings and cilia blackish-grey.

Mount Lofty, South Australia; one specimen in the collection of Mr. E. Guest. The short description given above was made several years ago; the specimen is no longer before me, and I feel doubtful whether its generic location was correctly ascertained; it is very distinct specifically.

130. *L. iriastis*, n.sp.

♂♀. 7-8 mm. Head, palpi, and thorax dark bronzy-fuscous. Antennæ, abdomen, and legs dark fuscous, legs ringed with whitish. Forewings dark bronzy-fuscous; a narrow straight

rather oblique white fascia at $\frac{1}{4}$; a white dorsal dot in middle; a small white quadrate costal spot slightly beyond middle; three bluish-silvery-metallic dots in disc, placed in a longitudinal series from $\frac{1}{3}$ to $\frac{2}{3}$; a white dot on tornus; a triangular white costal spot at $\frac{4}{5}$, continued into cilia; a bluish-silvery-metallic apical dot: cilia dark fuscous, terminal half whitish on a patch below apex. Hindwings and cilia dark fuscous.

Gisborne, Victoria, in January; two specimens received from Mr. G. Lyell.

19. *ZAPYRASTRA*, Meyr.

Antennæ $\frac{4}{5}$, in ♂ slightly thickened towards apex. Labial palpi moderately long, curved, ascending, smooth, terminal joint shorter than second, acute. Posterior tibiæ rough-haired. Forewings: 1b furcate, 7 and 8 stalked, 7 to costa, 9 absent. Hindwings $\frac{1}{2}$, elongate-lanceolate, cilia 5; transverse vein absent between 4 and 5, 5 and 6 stalked.

Founded on the single species following, common to Australia and New Zealand. Imago with forewings lanceolate

131. *Z. calliphana*, Meyr.

(*Zapyrastra calliphana*, Meyr., Trans. N. Zeal. Inst. 1888, 172.)

♂♀. 5-8 mm. Head, palpi, antennæ, thorax, abdomen, and legs dark shining bronze, face whitish-bronze, legs spotted with white. Forewings bright dark golden-bronze; markings pale violet-golden-metallic; a fascia near base, often ill-defined; a nearly perpendicular fascia before middle; a dot in disc beyond middle, beneath which is a black dot or small spot on fold; an inwardly oblique fascia at $\frac{3}{4}$; a small spot at tornus; a streak from apex along termen; a triangular snow-white spot on costa near apex: cilia fuscous-grey, round apex with two blackish lines, and a minute white dot above apex. Hindwings dark fuscous; cilia fuscous-grey.

Sydney and Bulli, New South Wales; Melbourne, Victoria; Deloraine and Hobart, Tasmania; occurs also in the South Island of New Zealand; from September to April, locally.

common, frequenting *Leptospermum*, on which the larva doubtless feeds.

20. *MOLYBDURGA*, n.g.

Antennæ $\frac{4}{3}$, in ♂—? Labial palpi moderately long, curved, ascending, second joint with appressed scales, terminal shorter, acute. Posterior tibiæ rough-haired. Forewings with metallic scale-tufts on surface; 1b furcate, 5 absent, 6 and 7 stalked, 7 to costa. Hindwings $\frac{3}{4}$, elongate-lanceolate, cilia 3; veins all separate.

Only the following species is known. Imago with forewings elongate, narrow, long-pointed, costa somewhat sinuate.

132. *M. metallophora*, n.sp.

♀. 12 mm. Head, antennæ, and thorax dark bronzy-metallic-fuscous. Palpi dark fuscous, second joint with whitish-ochreous lateral line. Abdomen dark fuscous. Legs dark fuscous, banded with silvery-whitish. Forewings dark shining bronzy, suffused towards dorsum anteriorly with pale orange-ochreous; a dark leaden-fuscous basal spot on costa; eleven transverse-oblong spots of raised leaden-metallic scales, viz., one subcostal at $\frac{1}{4}$, five costal from $\frac{1}{3}$ to near apex, one in disc before middle, and four dorsal from $\frac{1}{3}$ to $\frac{3}{4}$: cilia dark fuscous, with oblique leaden-metallic dashes on costal spots. Hindwings dark coppery-fuscous; cilia dark fuscous.

Melbourne, Victoria, in October; one specimen received from Rev. G. H. Raynor.

21. *AERAULA*, n.g.

Antennæ $\frac{3}{4}$, in ♂ shortly ciliated. Labial palpi long, recurved, somewhat rough-scaled anteriorly, terminal joint as long as second, acute. Abdomen broad, rather flattened. Posterior tibiæ smooth-scaled. Forewings with scale-tufts on surface; 1b simple, 6 absent, 7 to costa, 8 absent (?). Hindwings $\frac{2}{3}$, elongate-lanceolate, cilia 3; veins all separate (?).

Based on the following species, of which the neuration is not quite satisfactorily made out from the single specimen; it is however sufficiently separable from its allies. Forewings elongate, narrow, long-pointed, costa slightly sinuate.

133. *A. dioctis*, n.sp.

♂. 10 mm. Head, palpi, antennæ, and thorax dark bronzy-fuscous. Abdomen dark fuscous, last three segments whitish-ochreous, anal tuft dark fuscous. Legs dark fuscous. Forewings and cilia dark bronzy-fuscous. Hindwings and cilia dark fuscous, cilia paler and mixed with whitish-fuscous towards tornus.

Geraldton, West Australia; in November, one specimen.

22. *CORACISTIS*, n.g.

Antennæ over 1, in ♂ simple, in ♀ with projecting tuft of scales on back about middle. Labial palpi very long, recurved, second joint rough-scaled beneath at apex, terminal longer, acute. Posterior tibiæ rough-haired. Forewings with scale-tufts on surface; 1b furcate, 6 out of 7, 7 to costa, 8 out of 7. Hindwings $\frac{3}{4}$, elongate-lanceolate, cilia 2; veins all separate.

Includes only one species, of singular facies; the antennal scale-tuft of the ♀, of which there is no apparent trace in the ♂, is not only quite exceptional in the family, but its restriction to the female is an inversion of the prevailing law in similar structures. Imago with forewings elongate, narrow, long-pointed, costa sinuate.

134. *C. erythrocosma*, n.sp.

♂♀. 21-22 mm. Head dark fuscous, sides orange-red, face reddish-tinged. Palpi and antennæ dark fuscous. Thorax red, sides dark fuscous. Abdomen dark fuscous, segmental margins broadly white beneath. Legs dark fuscous, posterior tibiæ banded with white. Forewings blackish-fuscous, posteriorly coppery-tinged; scale-tufts somewhat purple-shining anteriorly: cilia dark fuscous. Hindwings dark fuscous, bronzy-tinged; cilia dark fuscous, becoming whitish on basal half towards tornus.

Melbourne, Victoria; two specimens received from Rev. G. H. Raynor.

23. *MICROCOLONA*, n.g.

Antennæ $\frac{4}{5}$ to almost 1, in ♂ simple. Labial palpi long, recurved, somewhat loosely scaled, terminal joint shorter than

second, acute. Posterior tibiae rough-haired. Forewings with scale-tufts on surface; 1b furcate or simple, 3 sometimes absent, 4 absent, 6 out of 7 or usually absent, 7 and 8 sometimes stalked, 7 to costa. Hindwings $\frac{1}{2}\frac{3}{5}$, linear or linear-lanceolate, cilia 6-8; 3 absent, 4 usually absent, 5 and 6 sometimes obsolete, transverse vein partly absent.

Type *M. churacta*. A characteristic Australian genus, of which there are also two species in New Zealand. It is a development of *Syntomactis*, differing essentially in the reduced neuration, but can also be recognised superficially by the different arrangement of the scale-tufts, which are in effect the normal stigmata. Imago with forewings elongate, narrow, long-pointed; most, if not all, of the species are attached to *Leptospermum* and allied Myrtaceous shrubs, though the larvæ are unknown; the species require careful discrimination.

- | | |
|--|---------------------------|
| 1. Head wholly white or ochreous-whitish..... | 2. |
| Head darker-sprinkled on crown..... | 4. |
| 2. Terminal joint of palpi wholly white..... | 147. <i>arizela</i> . |
| Terminal joint of palpi with two blackish rings | 3. |
| 3. Plical stigma before first discal..... | 142. <i>thymopis</i> . |
| Plical stigma beyond first discal..... | 135. <i>embolopis</i> . |
| 4. Second joint of palpi with blackish lateral line | 138. <i>nodata</i> . |
| Second joint of palpi with two blackish bands or rings..... | 5. |
| 5. Crown sprinkled with ochreous or reddish-ochreous | 6. |
| Crown sprinkled with grey, fuscous, or dark fuscous | 7. |
| 6. Forewings reddish-ochreous, plical stigma beneath first discal..... | 143. <i>epixutha</i> . |
| Forewings whitish-ochreous, plical stigma beyond first discal..... | 137. <i>crypticasis</i> . |
| 7. Forewings with clear white longitudinal subcostal streak..... | 8. |
| Forewings without such streak..... | 9. |
| 8. Plical stigma beneath first discal..... | 140. <i>leptopis</i> . |
| Plical stigma before first discal..... | 145. <i>leucochtha</i> . |
| 9. Forewings with broad whitish dorsal patch towards base..... | 141. <i>ponophora</i> . |
| Forewings without such patch..... | 10. |
| 10. Plical stigma before first discal..... | 11. |
| Plical stigma beyond first discal..... | 12. |

11. Forewings light reddish-ochreous..... 144. *trigonospila*.
 Forewings fuscous... 146. *sollennis*.
 12. Forewings whitish-ochreous; hindwings grey-
 whitish..... 136. *limodes*.
 Forewings ochreous-fuscous; hindwings fuscous.... 139. *characta*.

135. *M. embolopsis*, n.sp.

♂. 11 mm. Head ochreous-whitish. Palpi whitish, median band and subapical ring of second joint, and subbasal and subapical rings of terminal joint blackish. Antennæ ochreous-whitish, indistinctly ringed and towards apex banded with fuscous. Thorax whitish-ochreous, somewhat fuscous-sprinkled. Legs dark fuscous, ringed with ochreous-whitish. Forewings very narrow; whitish-ochreous, somewhat sprinkled with dark fuscous; a very small dark fuscous raised dot beneath fold before $\frac{1}{3}$; stigmata very small, raised, black, first discal at $\frac{2}{5}$, second at $\frac{3}{4}$, plical very obliquely beyond first discal, almost dorsal; a transverse raised black dot beneath second discal; a sharply defined semioval dark fuscous blotch on costa at $\frac{2}{3}$; cilia light fuscous, round apex mixed with whitish-ochreous, with a fuscous median line. Hindwings grey; cilia light fuscous.

Brisbane, Queensland; one specimen received from Dr. A. J. Turner. It is conspicuously distinguished by the dark posterior costal blotch.

136. *M. limodes*, n.sp.

♂. 9-10 mm. Head whitish, crown somewhat fuscous-sprinkled. Palpi whitish, median band and subapical ring of second joint, and subbasal and subapical rings of terminal joint blackish. Antennæ whitish, faintly fuscous-ringed. Thorax whitish, somewhat fuscous-sprinkled. Abdomen ochreous-whitish. Legs dark fuscous ringed with whitish, posterior pair ochreous-whitish with a blackish band on tibiae near base. Forewings whitish-ochreous, irregularly sprinkled with dark fuscous; a dark fuscous tuft beneath fold at $\frac{1}{3}$; stigmata small, raised, black, first discal before middle, second at $\frac{2}{3}$, plical obliquely beyond first discal, almost dorsal; a raised dark fuscous dot beneath second discal; a dark fuscous suffusion on costa about $\frac{2}{3}$; cilia whitish-ochreous, at

apex with a fuscous median line. Hindwings grey-whitish; cilia whitish-ochreous.

Christchurch, New Zealand; in March, three specimens. It is convenient to describe this New Zealand species here; it is not impossible that it may be found to occur also in Tasmania, and in any case it is closely connected with the Australian species.

137. *M. crypsicasis*, n.sp.

♂♀. 7-10 mm. Head white, crown ochreous-sprinkled. Palpi whitish, a broad band and apical ring of second joint, subbasal and subapical bands of terminal joint black. Antennæ whitish, ringed with fuscous. Thorax whitish-ochreous, irrorated with fuscous. Abdomen whitish. Legs dark fuscous, irrorated and ringed with whitish. Forewings whitish-ochreous, irrorated with fuscous; a raised black dot on fold at $\frac{1}{3}$, another beneath fold at $\frac{1}{3}$, a third in disc slightly above middle, a fourth beneath fold obliquely beyond third, almost dorsal, and two transversely placed close together above tornus; a cloudy dark fuscous spot on costæ before $\frac{2}{3}$; two black dots longitudinally placed at apex: cilia whitish-ochreous, mixed with fuscous round apex. Hindwings grey; cilia whitish-grey-ochreous.

Sydney, New South Wales; Deloraine, Tasmania; in October and November, five specimens.

138. *M. nodata*, n.sp.

♂♀. 7-8 mm. Head white, crown fuscous-sprinkled. Palpi white, second joint with a blackish lateral line, terminal joint with black subbasal and subapical rings. Antennæ whitish, beneath fuscous-spotted. Thorax whitish-ochreous, with two dark fuscous posterior spots. Abdomen whitish. Legs dark fuscous, irrorated and ringed with whitish. Forewings very narrow, ochreous, mixed with white and sprinkled with dark fuscous, almost wholly suffused with white on anterior half and sometimes throughout; a raised black dot on fold at $\frac{1}{3}$, a larger one beneath fold at $\frac{1}{3}$, a third in disc before middle, a fourth beneath fold obliquely beyond third, almost dorsal, and two trans-

versely placed close together or confluent above tornus; sometimes a blackish costal dot beyond middle; a black apical dot, and another obliquely above and before it: cilia whitish-ochreous, round apex sprinkled with black. Hindwings whitish-grey; cilia whitish-grey-ochreous.

Sydney, New South Wales; Deloraine, Tasmania; Albany, West Australia; from August to January, seven specimens.

139. *M. characta*, n.sp.

♂♀. 9-11 mm. Head whitish, crown more or less mixed with fuscous and dark fuscous. Palpi whitish, a broad band and sub-apical ring of second joint, and basal and subapical bands of terminal joint blackish. Antennæ whitish, fuscous-ringed, towards apex with several broader fuscous bands. Thorax fuscous, mixed with dark fuscous and whitish. Abdomen whitish-fuscous. Legs dark fuscous, irrorated and ringed with whitish. Forewings very narrow, ochreous-fuscous, more or less irrorated irregularly with dark fuscous, sometimes mixed with whitish towards dorsum anteriorly, and towards termen and costa posteriorly; sometimes a blackish costal mark near base; a tuft of ochreous and black scales beneath fold at $\frac{1}{3}$; a raised black white-edged elongate dot in disc somewhat before middle; a blackish raised dot beneath fold somewhat beyond this; an irregular black sometimes whitish-edged raised dot in disc beyond $\frac{2}{3}$; a blackish spot on costa before this, preceded by a pale spot; two or three irregularly placed undefined dark fuscous spots towards apex: cilia fuscous, base dark fuscous at apex. Hindwings and cilia fuscous.

Sydney and Blackheath (3500 feet), New South Wales; Nelson, New Zealand; from June to November, and in March (the New Zealand example in January); nine specimens. The single specimen taken in New Zealand does not seem to exhibit any essential difference, but further examples are desirable to establish its identity.

140. *M. leptopis*, n.sp.

♂. 8 mm. Head white, crown sprinkled with dark fuscous. Palpi white, a broad band and apical dot of second joint, and

subbasal and subapical rings of terminal joint black. Antennæ grey. Thorax whitish mixed with ochreous and dark fuscous, with a small blackish posterior spot. Abdomen whitish. Legs dark fuscous, ringed with whitish. Forewings ochreous, suffusedly mixed with white, and irrorated with black; a clear white longitudinal streak from base beneath costa to second discal stigma, edged above by an irregular clear bright ochreous streak; stigmata raised, black, first discal placed in middle of the white longitudinal streak, plical directly below it, second discal large: cilia whitish-fuscous, round apex mixed with white and sprinkled with black. Hindwings light grey; cilia whitish-fuscous.

Albany, West Australia; in December, one specimen.

141. *M. ponophora*, n.sp.

♂♀. 8-9 mm. Head whitish, crown sprinkled with dark fuscous. Palpi whitish, a broad band and apical dot of second joint, a subbasal ring and subapical band of terminal joint dark fuscous. Antennæ whitish, suffusedly ringed with fuscous. Thorax dark fuscous, posterior edge whitish. Abdomen fuscous, segmental margins whitish. Legs dark fuscous, ringed with whitish. Forewings brown, irregularly irrorated with dark fuscous; a broad whitish patch extending along basal $\frac{2}{5}$ of dorsum, a small whitish spot on middle of dorsum and another before tornus, separated by dark fuscous suffusion, sometimes subconfluent; discal stigmata black, raised, partially whitish-edged, first in middle, second at $\frac{3}{4}$; a small ochreous-whitish oblique triangular spot on costa before $\frac{3}{8}$, preceded and followed by patches of dark fuscous suffusion; two or three black dots longitudinally placed towards apex: cilia fuscous, round apex darker basally. Hindwings and cilia fuscous.

Sydney, New South Wales; from November to January, four specimens.

142. *M. thymopis*, n.sp.

♂♀. 6-7 mm. Head whitish, crown ochreous-tinged. Palpi whitish, a broad band and apical ring of second joint, subbasal and subapical rings of terminal joint black. Antennæ whitish, in ♀ ringed and banded with fuscous. Thorax ochreous sprinkled

with whitish. Abdomen light grey. Legs dark fuscous ringed with whitish. Forewings light ochreous, irregularly mixed with darker ochreous and whitish, margins suffusedly irrorated with black; some black irroration on fold towards base; a blackish dorsal spot near base; stigmata raised black, partly white-edged, first discal before middle, sometimes followed immediately by a small irregular dark fuscous patch, second small, plical obliquely before first discal; a patch of blackish suffusion on costa about $\frac{3}{4}$: cilia light fuscous, round apex whitish-ochreous sprinkled with black. Hindwings grey; cilia light fuscous.

Sydney, New South Wales; in August and November, two specimens. The ♂ shows a greater development of black scales, but the difference is possibly individual rather than sexual.

143. *M. epixutha*, n.sp.

♂♀. 6-8. mm. Head white, crown sprinkled with reddish-ochreous. Palpi white, a broad band and apical ring of second joint, subbasal and subapical rings of terminal joint black. Antennæ whitish, ringed with dark fuscous. Thorax reddish-ochreous, more or less sprinkled with black and whitish. Abdomen grey, segmental margins whitish. Legs dark fuscous, ringed with whitish. Forewings reddish-ochreous, irregularly mixed with whitish, irrorated on margins and sometimes also towards middle of disc with dark fuscous; a black basal median dot; stigmata raised, black, first discal before middle, plical directly beneath it, second discal at $\frac{3}{4}$, sometimes with a small black dot beneath it; a dark fuscous costal suffusion towards $\frac{3}{4}$: cilia light fuscous, round apex suffused with ochreous-whitish and sprinkled with black. Hindwings and cilia fuscous.

Sydney and Blackheath (3500 feet), New South Wales; in October, November, and March, seven specimens.

144. *M. trigonospila*, n.sp.

♂♀. 8-10 mm. Head whitish, crown irrorated with grey. Palpi whitish, median band and apical ring of second joint, subbasal and subapical rings of terminal joint black. Antennæ

whitish, ringed with fuscous. Thorax light reddish-ochreous, sprinkled with whitish, with a small dark fuscous posterior spot. Abdomen grey. Legs dark fuscous, irrorated and ringed with whitish. Forewings light reddish-ochreous, margins suffusedly irrorated with dark fuscous; stigmata raised, black, edged with whitish-ochreous, first discal somewhat before middle, second at $\frac{3}{4}$, plical obliquely before first discal: cilia fuscous, at apex with a black basal dot and short dark median line. Hindwings and cilia fuscous.

Glen Innes (3000 feet), New South Wales; Mount Macedon, Victoria; in November and December, four specimens.

145. *M. leucochtha*, n.sp.

♀. 8-9 mm. Head white, crown sprinkled with dark fuscous. Palpi white, lower $\frac{2}{3}$ of second joint, and subbasal and subapical rings of terminal joint black. Antennæ whitish, ringed with grey. Thorax whitish, mixed with dark grey. Abdomen light grey. Legs dark fuscous, indistinctly ringed with whitish. Forewings whitish, irrorated with dark fuscous; a broad clear white longitudinal suffusion extending from base to $\frac{3}{4}$, anteriorly nearly or quite reaching costa, posteriorly discal and suffusedly edged above with yellow-ochreous; sometimes a black basal median dot; stigmata raised, black, first discal before middle, second at $\frac{3}{4}$, plical obliquely before first discal; a black tornal dot beneath second discal: cilia light fuscous, at apex with a blackish basal dot and darker median line. Hindwings light grey; cilia light fuscous.

Sydney, New South Wales; Adelaide and Port Lincoln, South Australia; in October and November, three specimens.

146. *M. sollennis*, n.sp.

♂♀. 8-12 mm. Head whitish, crown irrorated with fuscous. Palpi whitish, basal $\frac{2}{3}$ and apical ring of second joint, subbasal and subapical rings of terminal joint blackish. Antennæ whitish, ringed with dark fuscous. Thorax fuscous, sprinkled with whitish. Abdomen light grey. Legs dark fuscous, ringed with

whitish. Forewings fuscous, irrorated with dark fuscous, with a few irregular whitish scales; a blackish basal median dot; stigmata rather large, raised, black, partially whitish-edged, first discal before middle, second at $\frac{3}{4}$, plical large, somewhat obliquely before first discal; a small black dot beneath second discal: cilia fuscous, round apex with blackish basal line and darker median line. Hindwings and cilia fuscous.

Sydney and Blackheath (3500 feet), New South Wales; in February and March, six specimens.

147. *M. arizela*, n.sp.

♂♀. 11-13 mm. Head white. Palpi white, second joint dark fuscous except towards apex. Antennæ white, ringed with fuscous. Thorax white, in ♂ with dark fuscous spots on shoulders and dorsal irroration. Abdomen fuscous. Legs whitish, banded with dark fuscous. Forewings white; a small black plical tuft, and a small blackish dorsal spot near base; costal edge sometimes irrorated with blackish; stigmata rather large, raised, black, first discal before middle, second at $\frac{3}{4}$, plical large, somewhat obliquely before first discal; a ferruginous-ochreous sometimes partially obsolete fascia from $\frac{2}{5}$ of costa, traversing first discal stigma, terminating in a broader blackish dorsal suffusion at $\frac{1}{2}$; a very oblique ferruginous-ochreous fascia from beyond middle of costa to termen below apex, more or less interrupted and ill-defined; termen and posterior half of costa variably suffused with coarse black irroration, more or less developed: cilia rather dark fuscous at apex mixed with black, above apex yellow-ochreous. Hindwings dark fuscous; cilia rather dark fuscous.

Bathurst (2000 feet), New South Wales; Hobart, Tasmania; in November and December, four specimens.

24. SYNTOMACTIS, Meyr.

Antennæ $\frac{4}{5}$, in ♂ serrate or simple. Labial palpi long, recurved, second joint dilated with whorled scales towards apex, terminal joint shorter or longer than second, acute, somewhat rough-scaled, usually with two or three distinct somewhat projecting whorls.

Posterior tibiæ rough-haired. Forewings with tufts of scales on surface; 1b furcate, 7 and 8 out of 6, 7 to costa. Hindwings $\frac{3}{5}$, narrow-lanceolate, cilia 3-4; transverse vein sometimes absent between 4 and 5, 6 and 7 seldom stalked.

A highly characteristic Australian genus, of which one species occurs in New Zealand; in this latter the normal scale-tufts are but ill developed, and were therefore not mentioned in my original description. The genus is a development of *Trachydora*, and only differs from it in the absence of the tuft on the second joint of palpi. The arrangement of the scale-tufts, which tend to form several oblique series of three tufts each, is the same in both. Imago with forewings elongate-lanceolate; the species are numerous, mostly similar and obscure, and present considerable difficulties. They are usually attached to species of *Myrtaceæ*, the known larvæ feeding in the spun shoots.

- | | |
|---|--------------------------|
| 1. Abdomen banded with ochreous-yellowish..... | 2. |
| Abdomen without yellowish band..... | 5. |
| 2. Forewings with broad median dark brown band.... | 3. |
| Forewings without such band..... | 4. |
| 3. Forewings with white antemedian costal spot in band..... | 164. <i>antithetis</i> . |
| Forewings without such spot..... | 163. <i>toreutica</i> . |
| 4. Forewings with narrow black antemedian fascia.... | 162. <i>phylactis</i> . |
| Forewings without such fascia..... | 159. <i>parascia</i> . |
| 5. Forewings with broad yellow-ochreous subcostal stripe..... | 168. <i>eximia</i> . |
| Forewings without such stripe..... | 6. |
| 6. Forewings with clear whitish markings..... | 7. |
| Forewings without clear whitish markings... .. | 11. |
| 7. Forewings with white subcostal streak..... | 161. <i>psoralea</i> . |
| Forewings without such streak..... | 8. |
| 8. Forewings with broad white median band..... | 165. <i>harmosta</i> . |
| Forewings without such band..... | 9. |
| 9. Forewings with white median dorsal spot..... | 166. <i>selenura</i> . |
| Forewings without such spot..... | 10. |
| 10. Forewings with indistinct spots of whitish-irroration | 155. <i>cyclonia</i> . |
| Forewings without spots of whitish irroration..... | 167. <i>tropaea</i> . |
| 11. Forewings with black median streak from disc to apex..... | 160. <i>ecstatica</i> . |
| Forewings without such streak... .. | 12. |

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|---|---------------------------|
| 12. Tufts in disc concolorous, not blackish..... | 13. |
| Tufts in disc blackish..... | 14. |
| 13. Forewings ferruginous..... | 148. <i>epiphrixia</i> . |
| Forewings whitish irrorated with fuscous..... | 153. <i>tephras</i> . |
| 14. Thorax ferruginous-ochreous, whitish-sprinkled.... | 15. |
| Thorax mixed with whitish and fuscous or dark
fuscous..... | 16. |
| 15. Head wholly whitish..... | 149. <i>hestiopa</i> . |
| Head irrorated with ochreous or fuscous..... | 151. <i>sedula</i> . |
| 16. Black irroration tending to form short longitudinal
streaks..... | 152. <i>anagrapta</i> . |
| Black irroration not forming short streaks..... | 17. |
| 17. Head clear ochreous-white..... | 153. <i>psarotricha</i> . |
| Head more or less dark-sprinkled..... | 18. |
| 18. Forewings with defined blackish apical dot..... | 19. |
| Forewings without such dot..... | 20. |
| 19. Abdomen greyish-ochreous..... | 157. <i>melanopa</i> . |
| Abdomen dark grey..... | 150. <i>ochlopa</i> . |
| 20. Expanse 6-8 mm.; groundcolour grey..... | 154. <i>cataspora</i> . |
| Expanse 9-10 mm.; groundcolour ochreous-brown... | 156. <i>capnopora</i> . |

148. *S. epiphrixia*, n.sp.

♂♀. 9-12 mm. Head grey, irrorated with whitish. Palpi whitish, second joint with seven or eight blackish rings, terminal joint with six blackish rings in pairs. Antennæ ringed with fuscous, white, and black successively. Thorax light ferruginous-brown. Abdomen dark fuscous. Legs dark fuscous, irrorated with whitish. Forewings ferruginous; margins suffused with dark fuscous irrorated with whitish, narrowly towards base, more broadly and extending over disc posteriorly: cilia fuscous, round apex irrorated with dark fuscous and whitish. Hindwings fuscous, darker posteriorly; cilia fuscous.

Sydney, New South Wales; from October to December, three specimens.

149. *S. hestiopa*, n.sp.

♂. 9 mm. Head whitish. Palpi whitish, second joint with five blackish rings, terminal joint with six blackish rings in pairs. Antennæ ringed with fuscous, white, and black successively. Thorax ferruginous-ochreous, dorsally mixed with whitish. Abdo-

men greyish-ochreous. Legs dark fuscous, irrorated and ringed with whitish. Forewings ferruginous-ochreous; narrow marginal streaks, costal spots before and beyond middle, larger dorsal spots at $\frac{1}{3}$ and $\frac{1}{2}$, and an apical patch fuscous irrorated with whitish; a black raised dot beneath fold at $\frac{1}{6}$, one above fold beyond this, another beneath fold at $\frac{1}{3}$, one beneath costa before middle, one in disc obliquely beyond this, one towards costa at $\frac{3}{5}$, and one near dorsum rather obliquely beyond this: cilia light fuscous, round apex irrorated with darker and whitish, with a dark fuscous subapical line. Hindwings fuscous; cilia light fuscous.

Sydney, New South Wales; in April, one specimen.

150. *S. ochlopa*, n.sp.

♂♀. 6-10 mm. Head whitish, more or less irrorated with fuscous. Palpi whitish, second joint with six black rings, terminal joint with six black rings tending to be confluent in pairs. Antennæ grey, sometimes whitish-ringed. Thorax fuscous, whitish-sprinkled. Abdomen dark grey. Legs dark fuscous, ringed with whitish. Forewings brown, bronzy-tinged; a narrow basal fascia and four inwardly oblique fasciæ of whitish irroration, two or three first sometimes interrupted to form quadrate costal and dorsal spots; costa suffusedly dark fuscous between these; a blackish posteriorly whitish-edged raised dot beneath fold at $\frac{1}{6}$, one above fold beyond this, another beneath fold at $\frac{1}{3}$, an oblique straight or bent series of three from beneath costa at $\frac{2}{5}$ to above middle of dorsum, and two others rather obliquely placed in disc beyond middle; a blackish apical dot: cilia fuscous, round apex dark fuscous irrorated with whitish. Hindwings fuscous or dark fuscous; cilia fuscous.

Sydney, New South Wales; Georges Bay, Tasmania; Albany, Geraldton, and York, West Australia; from October to March, common (eighteen specimens). Larva feeding in spun-up shoots of *Kunzea capitata* (*Myrtaceæ*) in November.

151. *S. sedula*, n.sp.

♂♀. 7-11 mm. Head whitish, crown irrorated with ochreous or fuscous. Palpi whitish, second joint with six blackish rings,

terminal joint with six black rings tending to be confluent in pairs. Antennæ whitish, ringed with dark fuscous. Thorax ochreous, irrorated with whitish. Abdomen grey. Legs dark fuscous irrorated with whitish. Forewings ferruginous-ochreous, more or less irrorated with whitish and fuscous; a small black posteriorly whitish-edged raised dot above fold at $\frac{1}{5}$, another beneath fold at $\frac{1}{3}$, one below costa at $\frac{2}{5}$, one in disc vertically beneath this, one near dorsum in middle, and two placed vertically in disc at $\frac{2}{3}$; cilia fuscous, round apex irrorated with whitish and dark fuscous. Hindwings and cilia fuscous.

Newcastle, Sydney, and Mount Kosciusko (2700 feet), New South Wales; from October to March, eight specimens.

152. *S. anagrapta*, n.sp.

♂♀. 7-8 mm. Head and thorax whitish, slightly fuscous-sprinkled. Palpi whitish, second joint with two pairs of dark fuscous rings, terminal joint with three pairs of one blackish and one fuscous ring each. Antennæ whitish, ringed alternately with fuscous and blackish. Abdomen grey. Legs whitish, with bands of fuscous and black irroration. Forewings brownish-ochreous, partially irrorated with whitish, especially towards base and dorsum, with irregularly strewn coarse black scales, tending to form short longitudinal streaks in disc and posteriorly; a blackish posteriorly whitish-edged raised dot at base, one on dorsum near base, one beneath fold beyond this, one above fold at $\frac{1}{5}$, one on costa towards base, one beneath fold at $\frac{1}{3}$, an oblique series of three from costa at $\frac{2}{5}$ to dorsum in middle, two rather obliquely placed in disc at $\frac{2}{3}$, one beneath costa at $\frac{2}{3}$, one above tornus, and one at apex: cilia light fuscous, round apex irrorated with whitish and darker. Hindwings grey, lighter towards base; cilia light fuscous.

Newcastle, New South Wales; in January, three specimens.

153. *S. psarotricha*, n.sp.

♂♀. 5-7 mm. Head clear ochreous-white. Palpi white, second joint with four or five dark fuscous rings, terminal joint with

three pairs of dark fuscous rings. Antennæ white, ringed with fuscous. Thorax whitish, more or less grey-sprinkled. Abdomen light greyish-ochreous. Legs dark fuscous, irrorated and ringed with whitish. Forewings ochreous, more or less nearly wholly suffused with grey, irrorated with whitish, and towards margins posteriorly with dark fuscous; a black posteriorly whitish-edged raised dot at base, one beneath fold at $\frac{1}{6}$, an oblique series of three from beneath costa at $\frac{1}{6}$ to above dorsum at $\frac{1}{3}$, a similar series from beneath costa at $\frac{2}{5}$ to above dorsum in middle, two somewhat obliquely placed in disc at $\frac{3}{5}$, and two transversely placed above tornus at $\frac{3}{4}$: cilia whitish-fuscous, round apex irrorated with whitish and fuscous. Hindwings pale grey; cilia whitish-fuscous.

Sydney, New South Wales; in September and December, seven specimens.

154. *S. cataspoda*, n.sp.

♂♀. 6-8 mm. Head and thorax whitish, irrorated with dark fuscous. Palpi whitish, second and terminal joints each with two fuscous bands marked with two or three black rings. Antennæ whitish, ringed with dark fuscous. Abdomen grey. Legs dark fuscous ringed with whitish. Forewings grey, irrorated with whitish and dark fuscous; an obscure yellow-ochreous spot beneath costa near base, one above tornus, and traces of ochreous suffusion in disc before and beyond middle; costal spots at $\frac{1}{5}$, $\frac{2}{5}$, and $\frac{3}{5}$, four small dorsal spots, a suffused blotch in disc before middle, spots in disc at $\frac{3}{5}$ and $\frac{3}{4}$, and an irregular apical suffusion formed of blackish irroration, very ill-defined: cilia fuscous, round apex irrorated with blackish and whitish. Hindwings grey, paler basally; cilia light fuscous.

Quorn, South Australia; in October, twelve specimens.

155. *S. cyclonia*, n.sp.

♀. 10 mm. Head and thorax whitish, irrorated with dark-fuscous. Palpi whitish, second joint with two, terminal joint with three bands of black irroration tending to form two or three rings each. Antennæ fuscous, ringed with dark fuscous and

indistinctly with whitish. Abdomen grey. Legs dark fuscous, irrorated and ringed with whitish. Forewings dark fuscous, irrorated with paler; a spot on base of costa, an obscure fascia at $\frac{1}{5}$, a spot on costa beyond this, reaching half across wing, an obscure fascia beyond middle, and a spot at tornus formed of whitish irroration, all indistinct; a clear whitish spot on costa at $\frac{3}{4}$: cilia light fuscous, round apex irrorated with whitish and darker. Hindwings fuscous; cilia light fuscous.

Sydney, New South Wales; in November, one specimen.

156. *S. capnopora*, n.sp.

♂. 9-10 mm. Head ochreous-whitish, slightly fuscous-sprinkled on crown. Palpi whitish, second joint with about five blackish rings, terminal joint with two pairs of blackish rings and one beneath apex. Antennæ fuscous, indistinctly ringed with dark fuscous and whitish. Thorax brownish, irrorated with whitish. Abdomen grey. Legs dark fuscous, irrorated and ringed with whitish. Forewings ochreous-brown; a basal and three other outwardly oblique fasciæ and an apical patch formed of whitish and fuscous irroration, very ill-defined and irregularly confluent in disc; a blackish raised dot above fold at $\frac{1}{8}$, one below fold at $\frac{1}{4}$, and an oblique series of three from below costa at $\frac{1}{4}$ to above dorsum before middle; some scattered black scales in disc posteriorly and towards apex: cilia light brownish, round apex irrorated with whitish and dark fuscous. Hindwings grey; cilia light fuscous.

Murrurundi and Picton, New South Wales; in September and October, two specimens.

157. *S. melanopa*, n.sp.

♂♀. 8-9 mm. Head whitish, crown sprinkled with dark fuscous. Palpi whitish, second joint with two, terminal joint with three bands of two or three subconfluent blackish rings each. Antennæ fuscous, ringed with whitish and blackish. Thorax fuscous-whitish mixed with dark fuscous. Abdomen greyish-ochreous. Legs dark fuscous, irrorated and ringed with whitish.

Forewings ochreous-brown, more or less nearly wholly suffused with dark fuscous and whitish irroration, with some irregularly scattered black scales; a transverse tuft of scales above fold at $\frac{1}{4}$, one below fold at $\frac{1}{3}$, two transversely placed in disc at $\frac{2}{5}$, two others similarly at $\frac{3}{5}$, one above dorsum before middle, and one above tornus; four spots of blackish suffusion on costa, fourth at $\frac{3}{4}$, and one on dorsum before middle; an elongate blackish apical dot: cilia light fuscous, round apex irrorated with whitish and dark fuscous. Hindwings fuscous; cilia light fuscous.

Sydney, New South Wales; in June and September, three specimens.

158. *S. tephras*, n.sp.

♀. 13 mm. Head whitish, crown fuscous-sprinkled. Palpi whitish, second joint with two, terminal joint with three bands of two or three ill-defined dark fuscous rings each. Antennæ whitish, ringed with fuscous. Thorax whitish, fuscous-sprinkled. Abdomen pale fuscous. Legs dark fuscous, irrorated and ringed with whitish. Forewings whitish, finely irrorated with fuscous; triangular spots of dark fuscous irroration on dorsum at $\frac{1}{4}$, before middle, and on tornus; four small indistinct spots of dark fuscous irroration on costa posteriorly: cilia fuscous, round apex irrorated with whitish and dark fuscous. Hindwings fuscous; cilia light fuscous.

Port Lincoln, South Australia; in November, one specimen.

159. *S. parascia*, n.sp.

♂♀. 9-11 mm. Head whitish, crown fuscous-sprinkled. Palpi whitish, second joint with six blackish rings, terminal joint with three pairs of blackish rings. Antennæ fuscous, ringed with dark fuscous and whitish. Thorax whitish, fuscous-sprinkled. Abdomen light grey, two basal segments banded with light ochreous-yellow. Legs dark fuscous, irrorated and ringed with whitish. Forewings whitish, irrorated with grey; some scattered black scales tending to form longitudinal lines; a transverse dark grey posteriorly white-edged tuft beneath fold at $\frac{1}{3}$, one beyond it above fold, one below fold at $\frac{1}{4}$, an oblique series of three from

beneath costa at $\frac{2}{5}$ to above dorsum before middle, two obliquely placed in disc at $\frac{2}{5}$, the lower one anterior, and one above tornus, all preceded by more or less distinct ochreous elongate spots or tinges; oblique undefined blackish costal marks near base and at $\frac{1}{3}$; usually an inwardly oblique undefined median fascia of blackish irroration: cilia fuscous, round apex irrorated with whitish and dark fuscous. Hindwings fuscous, darker posteriorly; cilia light fuscous.

Albany, West Australia; in December, five specimens.

160. *S. ecstatica*, n. sp.

♂♀. 10-14 mm. Head whitish, sprinkled with fuscous and black. Palpi whitish, second joint with two bands of about three subconfluent blackish rings each, terminal joint with three slight whorls, each preceded by a pair of blackish rings, and about four blackish rings towards apex. Antennæ fuscous, ringed with whitish and dark fuscous. Thorax whitish, irrorated with fuscous and sprinkled with black. Abdomen grey. Legs dark fuscous, ringed with whitish. Forewings whitish, irrorated with fuscous, and with scattered black scales tending to form short longitudinal streaks; a well-marked thicker black median longitudinal streak from before middle of disc to apex, sometimes interrupted at $\frac{2}{3}$ or $\frac{3}{4}$; oblique dark fuscous or blackish costal marks at $\frac{1}{3}$ and $\frac{2}{3}$, sometimes almost obsolete; tufts normal but not conspicuous: cilia fuscous, round apex irrorated with whitish and blackish. Hindwings and cilia fuscous.

Sydney, New South Wales; from September to January, on trunks of *Eucalyptus*, eight specimens.

161. *S. psoralea*, n. sp.

♂♀. 10-12 mm. Head whitish, crown fuscous-sprinkled. Palpi whitish, second joint with a subapical ring and two bands, and terminal joint with three bands of two rings each dark fuscous. Antennæ whitish, ringed with fuscous and dark fuscous. Thorax fuscous, irrorated with whitish. Abdomen whitish-fuscous. Legs dark fuscous, irrorated with whitish. Forewings brown,

irrorated with white; a well-marked dark fuscous longitudinal line from base above middle to apex, edged above by a rather broad white streak; a black raised dot beneath fold at $\frac{1}{4}$, two transversely placed in disc at $\frac{2}{5}$, one near dorsum before middle, two transversely placed and rather remote in disc at $\frac{3}{5}$, and one above tornus: cilia fuscous, round apex irrorated with whitish. Hindwings grey; cilia light fuscous.

Blackheath (3500 feet), New South Wales; Healesville, Victoria; in December and February, two specimens.

162. *S. phylactis*, n.sp.

♂. 10 mm. Head and thorax ochreous-whitish. Palpi whitish, basal joint, two pairs of ill-defined rings on second joint, and three on terminal blackish. Antennæ fuscous, ringed with whitish and blackish. Abdomen pale fuscous, with a dull orange-ochreous band before middle. Legs blackish, irrorated and ringed with whitish. Forewings whitish, irregularly irrorated with grey; a small black costal spot near base, and one on fold beyond it; a slightly curved oblique black fascia at $\frac{2}{5}$, beneath fold becoming a broader undefined black irroration, towards costa preceded by a whitish-ochreous tinge; an undefined whitish-ochreous spot beneath costa beyond middle, and one in disc at $\frac{3}{4}$; a spot of blackish irroration on costa beyond middle, and one on dorsum before tornus; a blackish elongate apical mark: cilia whitish-ochreous, round apex irrorated with dark fuscous and whitish. Hindwings grey; cilia whitish-fuscous, becoming whitish-ochreous at base, more broadly towards tornus.

Geraldton, West Australia; in November, one specimen.

163. *S. toreutica*, n.sp.

♀. 11 mm. Head and thorax white, slightly sprinkled with dark fuscous. Palpi whitish, second joint suffused with ochreous, with about six dark fuscous rings, terminal joint with two very oblique whorls and three pairs of dark fuscous rings. Antennæ fuscous, ringed with whitish and dark fuscous. Abdomen fuscous, with an ochreous-yellowish band before middle. Legs whitish,

banded with blackish. Forewings whitish; a small dark fuscous spot on costa near base, and one on fold below it, latter margined posteriorly and beneath by tufts of scales; a broad median dark brown band, irrorated and anteriorly broadly suffused with black, anterior edge sharply defined, running from costa at $\frac{2}{5}$ to dorsum at $\frac{1}{3}$, posterior edge from costa at $\frac{3}{4}$ to dorsum beyond tornus, deeply excavated in middle; five large somewhat coppery-metallic tufts placed in this band; an apical patch of black irroration, enclosing a marginal series of light brown spots: cilia light fuscous, below apex irrorated with whitish, above it with blackish. Hindwings fuscous, darker posteriorly; cilia light fuscous.

Sydney, New South Wales; in November, one specimen.

164. *S. antithetis*, n.sp.

♂♀. 10-11 mm. Differs from *S. toreutica* as follows: abdomen more suffused with ochreous-yellowish; forewings with anterior edge of dark band rising from costa before $\frac{1}{3}$, therefore hardly at all oblique, a white spot on costa before middle enclosed in the dark band.

Adelaide, South Australia; three specimens received from Mr. E. Guest. This is probably to be regarded only as a geographical form of *S. toreutica*, but since the two forms are at present clearly distinguishable, I have thought it best to keep them separate until more is known of them.

165. *S. harmosta*, n.sp.

♂♀. 11-12 mm. Head and thorax white, shoulders with a dark fuscous spot. Palpi white, second joint sprinkled with ochreous, with two blackish rings, terminal joint sometimes with two blackish rings. Antennæ whitish, ringed with fuscous. Abdomen grey. Legs whitish, banded with dark fuscous. Forewings dark grey, irrorated and mixed with white, with some scattered black scales; a broad irregular-edged clear white median band, dilated on dorsum, anterior edge concave; whitish partly ochreous-tinged tufts below fold near base and at $\frac{1}{3}$, above fold at $\frac{1}{5}$, two in disc on anterior edge of median band, one in band near dorsum,

preceded by some blackish scales, and one above tornus preceded by a yellow-ochreous spot; an elongate black discal mark in median band near posterior edge; a white transverse costal mark before $\frac{3}{4}$; a round undefined blackish spot towards apex, above and beneath which are sometimes yellow-ochreous spots: cilia grey, round apex white with a thick black subbasal and dark fuscous subapical line. Hindwings grey; cilia grey, basally tinged with whitish-yellowish.

Geraldton, West Australia; in November, two specimens.

166. *S. selenura*, n.sp.

♂. 13 mm. Head dark fuscous, irrorated with whitish. Palpi blackish, sprinkled with whitish. Antennæ fuscous, indistinctly ringed with whitish. Thorax ochreous-white, anterior margin irregularly dark fuscous. Abdomen dark grey. Legs blackish, irrorated and ringed with whitish. Forewings dark fuscous, sprinkled with black, scales finely and obscurely tipped with whitish; a small tuft above fold at $\frac{1}{5}$; a large dark fuscous tuft beneath fold at $\frac{3}{5}$, and two transversely placed in disc at $\frac{2}{5}$; a moderately large white semioval spot on dorsum in middle, edged anteriorly by a dark grey tuft, and posteriorly by a grey ridge-like tuft extending into disc; a grey transverse tuft on termen beyond tornus: cilia dark fuscous, round apex sprinkled with whitish. Hindwings rather dark fuscous; cilia fuscous.

Brisbane, Queensland; one specimen received from Mr. G. Barnard.

167. *S. tropaea*, n.sp.

♂♀. 10-12 mm. Head and thorax whitish, irrorated with dark fuscous. Palpi whitish, second joint with two, terminal joint with three distinct black rings, each accompanied by one or two less marked blackish rings. Antennæ whitish, ringed with grey and dark fuscous. Abdomen grey. Legs dark fuscous, irrorated and ringed with whitish. Forewings blackish-fuscous, irrorated with light brownish, with numerous small irregular undefined light brownish spots; tufts normal, dark fuscous, obscurely whitish-edged posteriorly; a white or ochreous-whitish spot on

costa at $\frac{3}{4}$: cilia fuscous, round apex irrorated with blackish and whitish. Hindwings grey; cilia fuscous.

Adelaide and Wirrabara, South Australia; Carnarvon, West Australia; in October, three specimens.

168. *S. eximia*, n.sp.

♀. 13 mm. Head and thorax light yellow-ochreous. Palpi whitish-ochreous, second joint with two, terminal joint with three bands of two subconfluent black rings each. Antennæ grey, ringed with black. Abdomen dark grey. Legs dark fuscous, ringed with whitish-ochreous. Forewings blackish; a broad yellow-ochreous subcostal stripe from base, becoming costal beyond middle, reaching to near apex, lower edge with a triangular prominence at $\frac{2}{5}$, including a tuft of scales, and curved downwards at $\frac{4}{5}$ so as to touch a yellow-ochreous tuft of scales in disc; a yellow-ochreous tuft of scales in disc below middle: cilia dark grey, round apex blackish, with a brown apical bar. Hindwings and cilia dark grey.

Albany, West Australia; in December, one specimen.

25. TRACHYDORA, n.g.

Antennæ $\frac{4}{5}$, in ♂ simple or shortly ciliated. Labial palpi long, recurved, second joint clothed with rough hairs towards apex, forming a projecting tuft beneath, terminal joint longer or shorter, sometimes loosely scaled, acute. Posterior tibiae rough-haired. Forewings with scale-tufts on surface; 1b furcate, 7 and 8 out of 6, 7 to costa. Hindwings $\frac{3}{5}$, narrow-lanceolate, cilia 3-5; transverse vein sometimes absent between 4 and 5, 5 and 6 sometimes stalked.

Type *T. illustris*. An endemic genus, probably of considerable extent, but the species are retired in habit and very liable to be overlooked. Imago with forewings elongate-lanceolate. As in the two preceding genera, the species seem usually attached to *Myrtaceæ*.

- | | |
|---------------------------------------|-------------------------|
| 1. Abdomen orange except at base..... | 176. <i>heliodora</i> . |
| Abdomen not orange posteriorly..... | 2. |

- | | |
|---|-----------------------------|
| 2. Abdomen with two or more basal segments sharply whitish-ochreous or yellowish..... | 3. |
| Abdomen with basal segments not sharply contrasted..... | 7. |
| 3. Head dark fuscous..... | 184. <i>chlorozona</i> . |
| Head whitish..... | 4. |
| 4. Cilia of hindwings with basal half partly yellow | 182. <i>musaea</i> . |
| Cilia of hindwings not partly yellow..... | 5. |
| 5. Forewings with dark median streak almost throughout..... | 6. |
| Forewings without dark median streak..... | 175. <i>droserodes</i> . |
| 6. Median streak blackish-fuscous throughout..... | 173. <i>peroneta</i> . |
| Median streak obscure, fuscous, at apex blackish | 174. <i>psammodes</i> . |
| 7. Forewings with oblique white strigulae from costa | 8. |
| Forewings without such strigulae..... | 12. |
| 8. Head and centre of thorax wholly white..... | 9. |
| Head and centre of thorax not wholly white..... | 10. |
| 9. Cilia of forewings at apex with white bar black-edged beneath..... | 170. <i>aphrocoma</i> . |
| Cilia of forewings without such bar..... | 169. <i>thyrsophora</i> . |
| 10. Forewings with two oblique white costal strigulae before middle..... | 11. |
| Forewings with one such strigula before middle | 179. <i>oxyzona</i> . |
| 11. Cilia of forewings with black apical bar..... | 171. <i>chalybanthes</i> . |
| Cilia of forewings without such bar..... | 172. <i>actinia</i> . |
| 12. Thorax wholly dark fuscous..... | 13. |
| Thorax not wholly dark fuscous..... | 16. |
| 13. Cilia of hindwings mostly yellowish..... | 185. <i>stephanopa</i> . |
| Cilia of hindwings not yellowish..... | 14. |
| 14. Forewings with yellowish discal dot and dash.... | 189. <i>placophanes</i> . |
| Forewings without such markings..... | 15. |
| 15. Abdomen with segmental margins white..... | 188. <i>porphyrescens</i> . |
| Abdomen with segmental margins not white..... | 187. <i>capnopa</i> . |
| 16. Thorax ferruginous..... | 181. <i>illustris</i> . |
| Thorax not ferruginous..... | 17. |
| 17. Head white..... | 178. <i>corysta</i> . |
| Head not white..... | 18. |
| 18. Forewings with whitish streak along dorsum..... | 19. |
| Forewings without such streak..... | 20. |
| 19. Cilia of hindwings partly yellow..... | 186. <i>heliotricha</i> . |
| Cilia of hindwings not yellow..... | 183. <i>leucura</i> . |
| 20. Forewings with white markings..... | 21. |
| Forewings without white markings..... | 177. <i>nomodoxa</i> . |

21. Forewings with white transverse mark before
 middle. 190. *astragalota*.
 Forewings without such mark..... 180. *euryplaca*.

169. *T. thyrsophora*, n.sp.

♀. 8 mm. Head and thorax white, patagia brown. Palpi white, second joint irrorated with fuscous, with dark fuscous median and subapical rings, terminal joint with dark fuscous anterior line. Antennæ grey. Abdomen fuscous. Legs whitish, obliquely banded with dark fuscous. Forewings rather dark brown, very finely striated with ochreous-whitish; an oblique dark fuscous mark from costa at $\frac{2}{5}$, edged by white costal strigulae; a white longitudinal streak beneath fold from base, interrupted by inwardly oblique bars of groundcolour before and beyond $\frac{2}{5}$; a slender raised leaden-metallic transverse fascia at $\frac{2}{3}$, dorsally margined by yellow-ochreous spots; a short black longitudinal line in disc at $\frac{3}{4}$, edged above with white, beneath limiting an extension of the second yellow-ochreous spot; beyond this a metallic dot, beneath which is a whitish mark: cilia fuscous, round apex irrorated with whitish, above apex with black basal and dark fuscous subapical lines. Hindwings and cilia fuscous.

Sydney, New South Wales; in November, one specimen.

170. *T. aphrocoma*, n.sp.

♀. 9-10 mm. Head and thorax white, patagia brown. Palpi white, second joint with dark fuscous rings above and below middle, terminal joint with dark fuscous anterior line. Antennæ white, ringed with light brown. Abdomen whitish. Legs whitish, with oblique dark fuscous rings. Forewings rather dark brown, irrorated with whitish; two thick oblique white streaks from costa before middle, reaching half across wing, second limited beneath by a short black longitudinal line in middle of disc; a white dorsal streak from base to about middle, upper edge emitting two oblique teeth towards $\frac{1}{3}$; a short black longitudinal line above tornus, and another in disc at $\frac{3}{4}$, edged above with white; submetallic whitish opposite transverse marks on costa at

$\frac{2}{3}$ and tornus; termen and posterior costal margin white: cilia pale fuscous, round apex blackish-sprinkled, at apex with a white bar edged beneath with blackish, above apex with tips white. Hindwings grey; cilia pale fuscous.

Sydney, New South Wales; in December and March, two specimens.

171. *T. chalybanthes*, n.sp.

♂♀. 10-11 mm. Head white, crown suffused with grey. Palpi white, second joint with two blackish bands and two fine sub-apical rings, tuft mixed with blackish, terminal joint with blackish anterior line. Antennæ grey, obscurely ringed with dark fuscous. Thorax fuscous mixed with whitish. Abdomen silvery-fuscous. Legs white, obliquely banded with dark fuscous. Forewings dark fuscous, on dorsal half and posteriorly irrorated with white; two oblique white streaks from costa before middle, not reaching half across wing, anterior produced along costa to base; two suffused inwardly oblique white marks beneath fold about $\frac{1}{3}$; a suffused white longitudinal streak in disc from before middle to before $\frac{3}{4}$, terminated by an entire transverse submetallic white-edged ridge of raised scales; a raised triangular blackish mark in disc beyond this, edged above strongly with white and posteriorly with metallic leaden-whitish; margins suffused with white towards apex, except on a dark fuscous apical bar: cilia grey, round apex whitish, with a strong black subbasal line, two other fine black lines, and a blackish apical bar. Hindwings grey, darker towards apex; cilia grey.

Sydney, New South Wales; Perth, West Australia; in October, November, and March, four specimens.

172. *T. actinia*, n.sp.

♂♀. 10-11 mm. Head and thorax white, sprinkled with dark fuscous. Palpi white, second joint with blackish subbasal band and five dark fuscous rings produced into the large tuft, terminal joint dark fuscous internally. Antennæ light fuscous or whitish, darker-ringed. Abdomen fuscous. Legs white, obliquely banded with dark fuscous. Forewings dark fuscous, on dorsal half and

posteriorly irrorated with white; two very oblique white streaks from costa before middle, terminating in median streak; a thick white median longitudinal streak from base to $\frac{2}{3}$, lower edge with an oblique dark fuscous indentation before middle, marked beyond middle with a black dash; an irregular white streak beneath fold throughout almost confluent with this; a short transverse ridge beneath fold beyond $\frac{1}{4}$, and an irregular transverse series of three before middle; an almost entire transverse white-edged ridge at $\frac{2}{4}$; a subtriangular black mark in disc towards apex, edged with white above and posteriorly; an elongate blackish apical mark, white-edged above and beneath: cilia fuscous, round apex white with a strong blackish basal line and two or three fine dark fuscous lines. Hindwings fuscous, darker towards apex; cilia fuscous.

Sydney, New South Wales; in November and December, two specimens.

173. *T. peroneta*, n.sp.

♂. 11 mm. Head and thorax grey-whitish, somewhat fuscous-sprinkled. Palpi whitish, second joint with subbasal and sub-apical blackish bands, terminal joint with three undefined bands of dark fuscous irroration. Antennæ fuscous-whitish, spotted with dark fuscous. Abdomen fuscous, basal third yellow-ochreous. Legs fuscous-whitish, anterior pair banded with dark fuscous. Forewings whitish, irrorated with pale fuscous; a thick rather irregular blackish-fuscous median longitudinal streak from base to apex, finely attenuated posteriorly; small fuscous sub-dorsal scale-tufts in middle and before tornus: cilia light fuscous, round apex mixed with whitish. Hindwings grey; cilia light fuscous.

Brisbane, Queensland; one specimen (Dr. A. J. Turner).

174. *T. psammodes*, n.sp.

♂. 11-12 mm. Head and thorax white, patagia whitish-ochreous. Palpi white, second joint with two black bands suffused beneath with ochreous, tuft short. Antennæ ochreous-whitish, basal joint fuscous. Abdomen whitish-fuscous, basal half whitish-

ochreous. Legs whitish, anterior pair dark fuscous. Forewings whitish-ochreous, yellow-tinged, more ochreous towards base of costa, with scattered black scales; a white costal streak from near base to $\frac{2}{3}$; an obscure fuscous median longitudinal streak from near base to apex, becoming blackish on an apical dash, and a similar streak along fold; a blackish mixed subdorsal scale-tuft beyond $\frac{1}{4}$, another at $\frac{1}{2}$, two transversely placed in disc at $\frac{1}{3}$, and two others at $\frac{2}{3}$: cilia whitish-ochreous, with a blackish apical bar, beneath this whitish, on costa with a cloudy blackish line. Hindwings pale grey; cilia whitish-grey-ochreous.

Sydney, New South Wales; in March, two specimens, taken at light.

175. *T. droserodes*, n.sp.

♂. 12 mm. Head, antennæ, and thorax whitish-ochreous. Palpi ochreous-whitish, second joint with six fine fuscous rings, tuft moderate, terminal joint with six indistinct fuscous rings. Abdomen whitish-fuscous, basal half whitish-yellowish, sides whitish. Legs whitish, anterior pair sprinkled with dark fuscous. Forewings light ochreous-yellowish, suffusedly irrorated with white, with a few scattered black scales, especially towards costa; a subdorsal scale-tuft at $\frac{1}{4}$, another before middle, two transversely placed in disc at $\frac{1}{3}$, and two others at $\frac{2}{3}$; a short fine black apical dash: cilia whitish-ochreous, round apex white irrorated with ochreous. Hindwings pale grey; cilia whitish-grey-ochreous.

Sydney, New South Wales; in October, one specimen.

176. *T. heliodora*, Low.

(*Pogonias heliodora*, Low., Trans. Roy. Soc. S. Austr. 1894, 108.)

I have not seen this species, which appears from the description to be distinct and probably referable here.

Duaringa, Queensland, in November.

177. *T. nomodoxa*, n.sp.

♂♀. 10-11 mm. Head and thorax light fuscous. Antennæ dark fuscous, finely and obscurely whitish-ringed. Palpi dark

fuscous irrorated with white, second joint with six obscure dark rings, tuft large, terminal joint long. Abdomen grey. Legs dark fuscous irrorated with whitish, posterior legs whitish banded with dark fuscous. Forewings fuscous irrorated with whitish and blackish; two blackish scale-tufts obliquely placed at $\frac{1}{2}$, three obliquely placed before middle, two transversely placed beyond middle, and one above tornus; two or three black marks on veins towards termen: cilia fuscous, round apex irrorated with white and black, indicating three dark lines. Hindwings fuscous; cilia light fuscous.

Geraldton and Perth, West Australia; in November, two specimens.

178. *T. corysta*, n.sp.

♂♀. 10-11 mm. Head white. Palpi white, second joint with two dark fuscous bands, terminal joint with three dark fuscous rings. Antennæ grey, ringed with dark fuscous. Thorax pale brownish-ochreous. Abdomen greyish-ochreous. Legs white, banded with dark fuscous. Forewings brownish-ochreous, irregularly and suffusedly irrorated with fuscous and whitish, with scattered black scales; short black oblique streaks from costa near base and at $\frac{1}{3}$; two black scale-tufts very obliquely placed about $\frac{1}{2}$, three obliquely placed before middle, two transversely placed beyond middle, and one above tornus: cilia light fuscous, round apex irrorated with white, with two dark fuscous lines. Hindwings light grey; cilia pale greyish-ochreous.

Bulli, New South Wales; Geraldton, West Australia; in October and November, two specimens.

179. *T. oxyzona*, n.sp.

♀. 10 mm. Head grey-whitish with several irregular dark grey lines, face whitish. Palpi white, second joint with a sub-basal band and four rings dark fuscous, tuft long, terminal joint internally dark fuscous with numerous fine white rings. Antennæ fuscous, darker-ringed. Thorax dark fuscous, patagia with a white spot. Abdomen rather dark fuscous, base paler and more ochreous. Legs white, obliquely banded with dark fuscous.

Forewings blackish-fuscous; base mixed with white; a fine white oblique strigula on costa at $\frac{1}{4}$; a moderate oblique white spot on middle of costa; a slightly curved very oblique white fascia-like streak from dorsum at $\frac{1}{3}$, passing close beneath and reaching beyond costal spot; a transverse white-edged subdorsal ridge-tuft at $\frac{1}{2}$, two others transversely placed at $\frac{2}{3}$, and one above tornus at $\frac{5}{8}$; two irregular white costal dots towards apex: cilia pale fuscous, round apex irrorated with dark fuscous and white, with a fine sharp black subbasal line, limiting a clear white basal patch beneath apex. Hindwings fuscous; cilia pale fuscous.

Adelaide, South Australia, in December; one specimen received from Mr. E. Guest.

180. *T. euryplaca*, Low.

(*Pogonias euryplaca*, Low., Trans. Roy. Soc. S. Austr. 1893, 171.)

Unknown to me, but apparently a good species. Adelaide, South Australia, in January.

181. *T. illustris*, n.sp.

♂♀. 14-17 mm. Head ferruginous-whitish. Palpi white, second joint ferruginous-whitish with lower $\frac{2}{3}$ suffused with dark fuscous irroration, terminal joint with three dark fuscous rings, tuft moderate. Antennæ fuscous, finely whitish-ringed. Thorax ferruginous. Abdomen ferruginous-fuscous, sides and apex fuscous. Legs dark fuscous, irrorated with whitish. Forewings pale greyish-ochreous, somewhat fuscous-sprinkled; basal area more or less mixed with blackish or dark fuscous, with two large ferruginous-tinged subdorsal tufts, and a smaller one above them; an oblique series of three posteriorly white-edged ridge-tufts before middle, followed by a whitish suffusion; a black dot or dash in middle of disc; two transversely placed posteriorly white-edged ridge-tufts at $\frac{2}{3}$; a deep ferruginous or dark red-brown costal patch extending from these to apex; some blackish scales at tornus: cilia above apex white, fuscous-sprinkled, with a thick blackish median line, beneath light greyish-ochreous, ferruginous-

tinged. Hindwings grey, darker posteriorly; cilia greyish-ochreous.

Sydney, New South Wales; Melbourne, Victoria; in December and March, two specimens.

182. *T. musaea*, n.sp.

♀. 18 mm. Head white, sprinkled with dark fuscous. Palpi white, second joint mixed with light fuscous, with two suffused dark fuscous bands, terminal joint with three undefined dark fuscous bands, tuft moderate. Antennæ fuscous-whitish, spotted with dark fuscous. Thorax fuscous mixed with black, with a central white stripe. Abdomen fuscous, basal half light ochreous-yellow. Legs white, banded with dark fuscous. Forewings white, suffusedly streaked with dark fuscous on veins; a broad median streak of dark fuscous suffusion from base to $\frac{3}{4}$, extending to dorsum on basal $\frac{2}{3}$ and a patch at tornus; three subdorsal and two discal tufts in dark basal area, which is partially mixed with brownish-ochreous; two tufts transversely placed at $\frac{3}{8}$, above which is a dark fuscous costal suffusion; an undefined dark fuscous apical suffusion: cilia light fuscous, on costa with two blackish lines separated by white and barred with blackish, beneath apex with three blackish basal bars, a subbasal blackish line throughout, and three suffused whitish lines on a subapical patch. Hindwings fuscous, darker posteriorly; cilia light fuscous, basal half light ochreous-yellowish from tornus to beyond middle.

Glen Innes (3500 feet), New South Wales; in December, one specimen.

183. *T. leucura*, n.sp.

♂. 18-19 mm. Head and thorax dark fuscous sprinkled with whitish, thorax with two blackish stripes. Palpi fuscous sprinkled with whitish, second joint with numerous suffused dark fuscous rings, terminal joints with three dark fuscous bands, tuft short. Antennæ fuscous-whitish, spotted with dark fuscous. Abdomen rather dark fuscous, anal claspers ochreous-white. Legs dark fuscous, ringed with whitish. Forewings rather dark fuscous, irregularly sprinkled with whitish, unevenly streaked with black

on veins; a whitish streak along dorsum throughout, forming a dilated spot before tornus; a subdorsal tuft near base, two irregular oblique series of three each at $\frac{1}{4}$ and before middle, and several scattered posterior tufts: cilia fuscous, irrorated with whitish, round apex suffusedly darker-barred on basal half. Hindwings rather dark fuscous; cilia light fuscous

Albany, West Australia; in December, two specimens.

184. *T. chlorozona*, n.sp.

♂♀. 17-20 mm. Head and thorax rather dark fuscous. Palpi fuscous, second joint suffused with dark fuscous, tuft short, terminal joint with three indistinct darker bands. Antennæ fuscous-whitish, spotted with dark fuscous. Abdomen dark fuscous mixed with whitish, two basal segments light ochreous-yellow. Legs dark fuscous, ringed with ochreous-whitish. Forewings dark fuscous, towards costa irrorated with ochreous-whitish; a suffused blackish-fuscous streak along fold; two tufts towards base, one beneath fold at $\frac{1}{4}$, an oblique series of three before middle, one beneath middle of costa, two transversely placed at $\frac{3}{5}$, and one beyond tornus; a blackish-fuscous apical dash: cilia fuscous, round apex irrorated with whitish, base white round apical dash. Hindwings and cilia fuscous.

Sydney, New South Wales; in October and December, two specimens.

185. *T. stephanopa*, n.sp.

♂. 14 mm. Head, antennæ, thorax, and abdomen dark fuscous, face ochreous-whitish. Palpi white, second joint with six blackish rings, terminal joint with numerous fine blackish rings, tuft long. Legs dark fuscous, ringed with ochreous-whitish. Forewings dark fuscous; an ochreous-whitish mark along costa before middle, and a similar mark on fold in middle; a large transverse tuft above dorsum at $\frac{1}{3}$, two obliquely placed before middle, and two transversely placed at $\frac{2}{3}$: cilia dark fuscous, round apex somewhat mixed with whitish, with a blackish-fuscous apical bar, towards tornus ochreous-yellow on basal half. Hindwings dark fuscous;

cilia dark fuscous, basal $\frac{3}{4}$ ochreous-yellow from tornus to near apex, costal cilia wholly ochreous-yellow.

Brisbane, Queensland; one specimen received from Mr. G. Barnard.

186. *T. heliotricha*, Low.

(*Pogonias heliotricha*, Low., Trans. Roy. Soc. S. Austr. 1894, 109.)

Not known to me. Gisborne, Victoria.

187. *T. capnopa*, Low.

(*Pogonias capnopa*, Low., Trans. Roy. Soc. S. Austr. 1894, 109.)

♂♀. 16-19 mm. Head, antennæ, thorax, abdomen, and legs dark fuscous. Palpi dark fuscous, second joint with three fine whitish rings towards apex, terminal joint with a whitish lateral line, tuft large. Forewings dark fuscous, finely sprinkled with whitish; a subdorsal tuft near base, two transversely placed at $\frac{1}{4}$, two obliquely placed before middle, two ridge-tufts transversely placed at $\frac{2}{3}$, and one at $\frac{5}{8}$: cilia dark fuscous, round apex sprinkled with whitish. Hindwings dark fuscous; cilia fuscous, base suffusedly fuscous-whitish from tornus to middle.

Melbourne, Mount Macedon, and Gisborne, Victoria; in December, three specimens.

188. *T. porphyrescens*, Low.

(*Pogonias porphyrescens*, Low., Trans. Roy. Soc. S. Austr. 1894, 109.)

I have not seen a specimen. Adelaide, South Australia, in December.

189. *T. placophanes*, n.sp.

♀. 11 mm. Head, antennæ, and thorax dark fuscous. Palpi dark fuscous, sprinkled with whitish, tuft short. Abdomen fuscous, segmental margins white. Legs dark fuscous, sprinkled with whitish, posterior tibiæ with two sharp white bands. Forewings dark fuscous, finely sprinkled with whitish; undefined blackish-fuscous antemedian, postmedian, and apical fasciæ;

numerous rather large somewhat purple-shining tufts; an interrupted basal dash, a dot beneath middle of disc, and a dash at $\frac{2}{3}$ yellow-ochreous: cilia fuscous, round apex dark fuscous sprinkled with whitish. Hindwings fuscous, towards base lighter and thinly scaled; cilia pale fuscous, base slightly yellowish-tinged towards tornus.

Mount Lofty, South Australia; one specimen received from Mr. E. Guest.

190. *T. astragalota*, n.sp.

♀. 11 mm. Head, palpi, antennæ, thorax, and legs dark fuscous irrorated with whitish, palpi with two white rings on terminal joint, tuft rather short. Abdomen fuscous. Forewings blackish-fuscous, faintly purplish-tinged, sprinkled with whitish; a transverse white mark above middle at $\frac{2}{5}$, preceded by an ochreous suffusion; an elongate white dot beneath middle of costa, followed by an ochreous suffusion extending beneath costa to near apex; a transverse-oblong white mark above tornus: cilia fuscous; round apex dark fuscous sprinkled with whitish. Hindwings fuscous, paler and thinly scaled towards base, apex darker; cilia fuscous.

Adelaide, South Australia, in September; one specimen received from Mr. O. B. Lower.

26. ORTHROMIOTA, n.g.

Antennæ $\frac{4}{5}$, in ♂ simple, basal joint dilated and concave to form a small eyecap. Labial palpi long, recurved, second joint with rough projecting scales beneath towards apex, terminal longer, acute. Posterior tibiæ with bristly hairs. Forewings with scale-tufts on surface; 1b furcate, 7 to costa. Hindwings $\frac{3}{5}$, narrow-lanceolate, cilia 3; veins all separate, transverse vein partly obsolete beyond 4.

• Based on the following species only, which is a singular early synthetic type. Imago with forewings elongate-lanceolate.

191. *O. galactitis*, n.sp.

♂♀. 10-11 mm. Head and thorax white, sometimes slightly fuscous-sprinkled. Palpi white, second joint and base of terminal

dark fuscous. Antennæ fuscous-whitish, base white. Abdomen fuscous. Legs dark fuscous ringed with ochreous-whitish, posterior pair wholly ochreous-whitish. Forewings fuscous-whitish, irrorated and sometimes suffused with fuscous; an irregular dark fuscous costal streak from near base to beyond middle, usually bordered throughout beneath by a broad clear white streak from base of costa, but in one specimen this is suffused with fuscous from base to middle; first discal stigma elongate, blackish, confluent with costal streak; a large subdorsal tuft before middle, and several small ones in disc and at tornus; posterior third of costa and sometimes termen dotted with dark fuscous: cilia light fuscous, round apex sprinkled with whitish. Hindwings fuscous, darker posteriorly; cilia light fuscous.

Duaranga and Toowoomba, Queensland; in November and December, five specimens.

27. *HELIOZELA*, H. Schöff.

Antennæ $\frac{3}{2}$, in ♂ thick, simple. Labial palpi short or very short, drooping, filiform, pointed. Posterior tibiae loosely haired. Forewings: 1b simple, 5 absent, 6 and 7 stalked, 7 to costa, 8 absent, 9 absent, 10 sometimes out of 7 near base. Hindwings $\frac{3}{4}$, lanceolate, cilia 2-4; 2 absent, transverse vein absent between 3 and 4, 6 absent.

A small but probably nearly cosmopolitan genus; the species are however usually so small, obscure, and difficult of observation, that they are often passed over. Imago with forewings broad-lanceolate; the species habitually fly in sunshine. Larva of exotic species almost apodal, mining in petioles, leaves, or twigs, often hard to detect; pupa in an oval case cut out from the leaf; these have not been observed in Australia, but probably have similar habits.

- | | |
|--|-------------------------|
| 1. Forewings with entire antemedian fascia..... | 202. <i>autogenes</i> . |
| Forewings without entire fascia..... | 2. |
| 2. Forewings with posterior costal spot..... | 3. |
| Forewings without costal spot..... | 6. |
| 3. Apical cilia whitish on terminal two-thirds... .. | 4. |
| Apical cilia whitish on terminal third only..... | 5. |

4. Forewings whitish-grey, hindwings dark fuscous.. 200. *nephelitis*.
Forewings shining bronzy-fuscous, hindwings
coppery-fuscous. 201. *isochroa*.
5. Forewings with bluish discal patch, costal spot
narrow..... 198. *anantia*.
Forewings without bluish patch, costal spot broad 199. *trisphaera*.
6. Forewings with pale dorsal spots..... 7.
Forewings without pale dorsal spots..... 192. *siderias*.
7. Dorsal spots golden-silvery-metallic..... 197. *cryspimetalla*.
Dorsal spots not metallic..... 8.
8. Dorsal spots yellowish..... 196. *eucarpa*.
Dorsal spots whitish..... 9.
9. Forewings pale grey..... 193. *catoptrias*.
Forewings fuscous-grey or dark bronzy-fuscous... 10.
10. Cilia of forewings with tips whitish beyond two
dark lines..... 195. *prodela*.
Cilia of forewings with whitish apical patch on
terminal half, preceded by black scales..... 194. *microphylla*.

192. *H. siderias*, n.sp.

♂. 4.5 mm. Head and thorax pale shining grey. Palpi, antennæ, abdomen, and legs grey; posterior legs whitish. Forewings and cilia pale glossy grey, very minutely sprinkled with black. Hindwings light bronzy-grey; cilia light grey.

Adelaide, South Australia; in October, two specimens.

193. *H. catoptrias*, n.sp.

♂♀. 3.4 mm. Head and thorax pale shining grey. Palpi, antennæ, abdomen, and legs grey, posterior legs grey-whitish. Forewings light glossy grey; a triangular whitish tornal spot: cilia pale grey. Hindwings bronzy-grey; cilia pale grey.

Sydney, New South Wales; in August and October, three specimens.

194. *H. microphylla*, n.sp.

♂♀. 3.5 mm. Head, antennæ, thorax, and abdomen shining fuscous-grey, face paler. Palpi fuscous, internally whitish. Legs dark fuscous, hairs of posterior tibiæ whitish. Forewings glossy fuscous-grey, somewhat darker-mixed, slightly purplish-tinged; a quadrate whitish dorsal spot at $\frac{1}{4}$, sometimes obsolete; a distinct

triangular white spot before tornus : cilia grey, at apex with a whitish spot on terminal half, preceded by some black scales. Hindwings rather dark coppery-fuscous; cilia grey.

Albany, West Australia; in December, eleven specimens.

195. *H. prodela*, n.sp.

♂♀. 6-8 mm. Head, antennæ, thorax, and abdomen shining dark bronzy-fuscous, face paler. Palpi fuscous, internally whitish. Legs dark fuscous, hairs of posterior tibiæ whitish. Forewings shining dark bronzy-fuscous; a somewhat oblique narrow whitish dorsal spot at $\frac{1}{4}$; a triangular whitish spot before tornus : cilia bronzy-fuscous, with two well-marked dark fuscous lines, tips beyond second fuscous-whitish. Hindwings rather dark coppery-fuscous; cilia fuscous.

Brisbane, Queensland; Sydney, New South Wales; Deloraine, Tasmania; from September to November, five specimens.

196. *H. eucarpa*, n.sp.

♂♀. 7-8 mm. Head, antennæ, thorax, and abdomen shining dark bronzy-fuscous, face paler. Palpi fuscous, internally whitish. Legs dark fuscous, hairs of posterior tibiæ whitish. Forewings shining dark purplish-bronzy-fuscous; an oblique pale yellow dorsal spot at $\frac{1}{4}$; a triangular pale yellow spot before tornus : cilia bronzy-fuscous, with two well-marked dark fuscous lines. Hindwings rather dark coppery-fuscous; cilia fuscous.

Sydney and Blackheath (3500 feet), New South Wales; in October and February, two specimens.

197. *H. crypsimetalla*, n.sp.

♂. 7-8 mm. Head and thorax rather dark purplish-bronzy-fuscous, face paler. Palpi, antennæ, and abdomen fuscous. Legs dark fuscous, hairs of posterior tibiæ whitish. Forewings rather dark purplish-bronzy-fuscous; a small obscure golden-silvery-metallic dorsal spot before middle, and a second, triangular and more distinct, before tornus, sometimes tending to be connected by an obscure metallic suffusion : cilia rather dark bronzy-fuscous,

apical third whitish on upper half of termen. Hindwings rather dark bronzy-fuscous; cilia fuscous.

Mount Lofty, South Australia; in October, two specimens.

198. *H. anantia*, n.sp.

♂. 5-6 mm. Head, antennæ, thorax, abdomen, and legs dark fuscous, face whitish-fuscous, posterior tibiæ whitish-suffused; palpi whitish. Forewings dark fuscous, bluish-tinged, with a round dull metallic-bluish patch in middle of disc; two or three whitish scales on fold at $\frac{1}{2}$; a small triangular white spot before tornus; a wedge-shaped white spot on costa at $\frac{4}{5}$, reaching half across wing: cilia rather dark fuscous, terminal third beyond a dark fuscous line whitish. Hindwings dark fuscous; cilia fuscous.

Deloraine, Tasmania; in November, two specimens.

199. *H. trisphaera*, n.sp.

♀. 6-7 mm. Head, antennæ, thorax, and abdomen shining dark bronzy-fuscous, face shining whitish-fuscous. Palpi whitish. Legs dark fuscous, posterior pair whitish-suffused. Forewings shining dark purplish-bronzy-fuscous; an oblique subdorsal spot at $\frac{1}{2}$, almost reaching dorsum, a triangular spot before tornus, and a larger triangular spot on costa at $\frac{3}{4}$, reaching more than half across wing, shining white, faintly yellowish-tinged: cilia bronzy-fuscous, with two dark fuscous lines, tips beyond second fuscous-whitish. Hindwings dark fuscous, purplish-tinged; cilia fuscous.

Sydney, New South Wales; Adelaide and Wirrabara, South Australia; in October, three specimens.

200. *H. nephelitis*, n.sp.

♂♀. 5-6 mm. Head, antennæ, and thorax grey, face and palpi whitish. Abdomen dark grey. Legs dark fuscous, posterior pair suffused with whitish. Forewings grey, whitish-mixed, posteriorly and on dorsum mixed with dark fuscous; an undefined whitish subdorsal spot at $\frac{1}{4}$; a triangular white spot before tornus, and a larger triangular white spot on costa at $\frac{3}{4}$, reaching more than

half across wing: cilia grey, terminal $\frac{2}{3}$ beyond a blackish line wholly grey-whitish. Hindwings dark fuscous; cilia fuscous.

Sydney, New South Wales; in September and October, three specimens.

201. *H. isochroa*, n.sp.

♂. 6 mm. Head, antennæ, and thorax light shining bronzy-fuscous. Palpi whitish. Abdomen fuscous. Legs dark fuscous, posterior tibiæ whitish-suffused. Forewings rather light shining bronzy-fuscous; an indistinct whitish subdorsal suffusion at $\frac{1}{4}$; a triangular white spot before tornus, and another on costa at $\frac{3}{4}$, reaching half across wing: cilia whitish-fuscous, round apex with a whitish patch occupying terminal $\frac{2}{3}$, preceded by some dark fuscous scales. Hindwings coppery-fuscous; cilia light fuscous.

Sydney, New South Wales; in October, one specimen, on flowers of *Callistemon*.

202. *H. autogenes*, n.sp.

♀. 7 mm. Head and thorax shining bronze. Palpi whitish. Antennæ, abdomen, and legs dark bronzy-fuscous, tarsi white-ringed. Forewings deep shining bronze; a straight narrow perpendicular shining whitish fascia at $\frac{1}{4}$; a triangular shining whitish spot before tornus, and another on costa at $\frac{2}{3}$: cilia whitish, basal third coppery-bronze. Hindwings dark grey; cilia grey.

Brisbane, Queensland; in September, one specimen.

28. *PSELIASTIS*, n.g.

Antennæ $\frac{3}{5}$, in ♂ simple. Labial palpi rudimentary. Posterior tibiæ smooth-scaled. Forewings: 1b simple, 3 absent, 5 absent, 6 out of 7 or absent, 7 to costa, 8 absent, 9 absent. Hindwings $\frac{3}{4}$, lanceolate, cilia 2; 2 absent, transverse vein absent between 3 and 4, 4 and 5 stalked, 6 absent.

Type *P. trizona*. A small endemic genus, of which the known species are all Tasmanian. Imago with forewings lanceolate; the species fly in bright sunshine.

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|---------------------------------------|---------------------------|
| 1. Forewings with whitish fasciæ..... | 2. |
| Forewings unicolorous..... | 205. <i>xanthodisca</i> . |
| 2. First fascia very broad..... | 203. <i>spectropa</i> . |
| First fascia narrow..... | 204. <i>trizona</i> . |

203. *P. spectropa*, n.sp.

♀. 7 mm. Head and thorax bright shining bronze, face bronzy-whitish. Antennæ dark bronzy-fuscous. Abdomen grey. Legs dark bronzy-fuscous, posterior tibiæ whitish. Forewings bright shining golden-bronze; a broad fascia at $\frac{1}{4}$, a slender slightly inwardly oblique fascia somewhat before middle, and an irregular fascia at $\frac{3}{4}$ not reaching dorsum shining whitish; apical area and cilia pale greyish-ochreous. Hindwings and cilia light grey.

Tasmania; one specimen received from Rev. G. H. Raynor, but exact locality unrecorded.

204. *P. trizona*, n.sp.

♂♀. 6-8 mm. Head and thorax bright shining bronze, face whitish-ochreous. Antennæ and abdomen dark fuscous. Legs dark bronzy-fuscous, posterior tibiæ whitish-suffused. Forewings bright shining golden-bronze; straight narrow perpendicular entire fasciæ at $\frac{1}{4}$ and $\frac{1}{2}$, and a broader fascia at $\frac{4}{5}$ not quite reaching dorsum shining whitish: cilia light fuscous, basal third rather dark bronzy-fuscous. Hindwings dark fuscous; cilia fuscous.

Hobart, Tasmania; in December, twenty specimens.

205. *P. xanthodisca*, n.sp.

♂♀. 6-8 mm. Head, antennæ, and thorax bright shining bronze. Abdomen in ♂ orange-ochreous, with dorsal series of dark fuscous dots, in ♀ dark bronzy-fuscous. Legs shining dark grey, posterior tibiæ yellowish. Forewings and cilia bright shining bronze. Hindwings shining grey, in ♂ with an ochreous-yellow patch covering dorsal $\frac{2}{3}$ from base to beyond middle; cilia pale grey, in ♂ yellowish-tinged towards tornus.

Hobart, Tasmania; in December, twelve specimens.

29. PROPHYLACTIS, n.g.

Antennæ $\frac{2}{3}$, in ♂ rather thick, simple, basal joint with dense anterior flap of scales forming small eyecap. Labial palpi short, drooping, filiform, pointed. Posterior tibiæ clothed with long hairs. Forewings: 1b simple, 3 absent, 5 absent, 6 and 7 stalked, 7 to costa, 8 absent, 9 sometimes absent. Hindwings $\frac{3}{4}$, lanceolate, cilia 2-3; transverse vein absent between 3 and 4, 6 absent.

Type *P. argochalca*. A small endemic genus, a development of *Hoplophanes*, which it resembles in appearance and habits. Imago with forewings lanceolate; flight in sunshine.

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|--|----------------------------|
| 1. Forewings unicolorous..... | 2. |
| Forewings with whitish posterior markings..... | 206. <i>aglaodora</i> . |
| 2. Forewings shining bronze..... | 207. <i>chalcopetala</i> . |
| Forewings shining whitish-grey..... | 208. <i>argochalca</i> . |

206. *P. aglaodora*, n.sp.

♂. 10 mm. Head, palpi, and thorax bright shining golden-bronze. Antennæ, abdomen, and legs dark grey, hairs of posterior tibiæ whitish. Forewings bright shining golden-bronze, posteriorly coppery-tinged; a coppery-purple suffusion towards costa beyond middle; a triangular spot before tornus, and an undefined fascia from costa before apex to termen above tornus shining whitish: cilia pale fuscous, basal half brassy-bronze. Hindwings dark grey; cilia grey.

Albany, West Australia; in September, one specimen.

207. *P. chalcopetala*, n.sp.

♂. 10-11 mm. Head, palpi, antennæ, and thorax shining bronze. Abdomen and legs dark fuscous, hairs of posterior tibiæ whitish-ochreous. Forewings shining bronze, sometimes brownish-tinged: cilia bronzy-ochreous. Hindwings and cilia dark fuscous.

Sydney, New South Wales; in October and November, six specimens.

208. *P. argochalca*, n.sp.

♂♀. 7-11 mm. Head, palpi, antennæ, and thorax pale shining bronzy-grey. Abdomen grey. Legs dark grey, posterior pair

grey-whitish. Forewings shining whitish-grey, sometimes faintly bronzy-tinged: cilia ochreous-whitish. Hindwings grey; cilia whitish-grey, sometimes ochreous-tinged.

Albany, West Australia; in September, October, and December, ten specimens.

30. HOPLOPHANES, n.g.

Antennæ $\frac{4}{5}$, in ♂ shortly ciliated. Labial palpi moderate or short, straight, rather drooping, filiform, pointed. Posterior tibiae clothed with long hairs. Forewings: 1b simple, 5 absent, 7 to costa, 8 absent. Hindwings $\frac{2}{3}$ - $\frac{4}{5}$, lanceolate or ovate-lanceolate, cilia $1\frac{1}{4}$ -3; transverse vein absent between 3 and 4, 5 and 6 sometimes stalked; in ♂ a ridge of long appressed hairscales beneath costa towards base.

Type *H. tritocosma*. An interesting genus, wholly endemic, and chiefly characteristic of West Australia, where it will doubtless prove to be of considerable extent. Imago with forewings lanceolate or broad-lanceolate; most of the species appear to fly naturally in sunshine. The larval habits are entirely unknown; but the long-pointed abdomen of the ♀, furnished with a long exserted ovipositor, is so similar to that of other species which deposit their eggs in flowers (especially in the heads of *Compositae*), that I should be disposed to conjecture a similar mode of life.

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|---|----------------------------|
| 1. Forewings ochreous-yellowish..... | 2. |
| Forewings bronzy | 4. |
| 2. Forewings with terminal cilia fuscous.... | 209. <i>haplochrysa</i> . |
| Forewings with terminal cilia yellowish..... | 3. |
| 3. Forewings with dark fuscous costal streak..... | 211. <i>hemiphragma</i> . |
| Forewings with costal edge only dark fuscous..... | 210. <i>chlorochrysa</i> . |
| 4. Forewings with white or yellowish markings..... | 5. |
| Forewings without such markings..... | 9. |
| 5. Forewings with white markings before middle.... | 6. |
| Forewings without white markings before middle | 7. |
| 6. Forewings with white terminal fascia..... | 212. <i>heterospila</i> . |
| Forewings without white terminal fascia.. | 213. <i>tritocosma</i> . |
| 7. Forewings with fascia near beyond middle..... | 8. |
| Forewings with fascia near apex only..... | 216. <i>monosema</i> . |
| 8. Forewings purple-suffused, fascia yellowish..... | 215. <i>semicuprea</i> . |
| Forewings not purplish, fascia whitish..... | 214. <i>acrozona</i> . |

- | | |
|---|---------------------------|
| 9. Forewings densely irrorated with purple..... | 217. <i>porphyropla</i> . |
| Forewings not irrorated with purple..... | 10. |
| 10. Forewings irrorated with dark fuscous..... | 223. <i>phaeochalca</i> . |
| Forewings not irrorated with dark fuscous..... | 11. |
| 11. Forewings bronze..... | 12. |
| Forewings pale bronzy-grey..... | 15. |
| 12. Forewings not or obscurely purplish-tinged..... | 13. |
| Forewings tinged with bright coppery-purple | 14. |
| 13. Head fuscous-bronze..... | 221. <i>philomacha</i> . |
| Head light yellowish-bronze..... | 219. <i>chalcolitha</i> . |
| 14. Forewings with scattered pale golden scales ;
expanse 6 mm..... | 222. <i>panchalca</i> . |
| Forewings without scattered pale golden scales
expanse 10-14 mm..... | 218. <i>electritis</i> . |
| 15. Hindwings grey; expanse 12-15 mm..... | 220. <i>niphochalca</i> . |
| Hindwings rather dark purplish-fuscous; expanse
7-8 mm..... | 224. <i>peristera</i> . |

209. *H. haplochrysa*, n.sp.

♂. 16 mm. Head deep orange-yellow, face paler. Palpi pale ochreous. Antennæ dark fuscous. Thorax dark fuscous, with a small posterior yellow spot. Abdomen pale ochreous-yellowish. Legs dark fuscous, hairs of posterior tibiæ ochreous-yellowish. Forewings shining ochreous-yellow; costal edge dark fuscous from base to middle: cilia rather dark fuscous, basal half purplish-suffused, on costa ochreous-yellow. Hindwings dark grey; cilia pale fuscous, on costa whitish-yellowish.

Albany, West Australia; in October, one specimen.

210. *H. chlorochrysa*, n.sp.

♂. 15-16 mm. Head deep orange-yellow, face paler. Palpi pale ochreous-yellowish. Antennæ ochreous-whitish. Thorax ochreous-yellow, anteriorly more or less suffused with dark purplish-fuscous. Abdomen pale ochreous-yellowish. Legs dark fuscous, hairs of posterior tibiæ ochreous-yellowish. Forewings shining light ochreous-yellow; costal edge dark fuscous from base to middle; an irregular undefined dark fuscous spot before tornus; undefined variable dark fuscous spots in disc at $\frac{2}{3}$ and towards apex, sometimes almost wholly obsolete, former some-

times subconfluent with prætornal spot: cilia pale ochreous-yellow. Hindwings grey; cilia whitish-ochreous, on costa grey-suffused at base.

York and Albany, West Australia; in September and October, nine specimens.

211. *H. hemiphragma*, n.sp.

♂. 12-16 mm. Head deep orange-yellow, face infuscated. Palpi whitish-ochreous. Antennæ ochreous-whitish. Thorax pale ochreous-yellowish, anteriorly more or less suffused with dark fuscous. Abdomen whitish-ochreous, base of segments sometimes dark fuscous. Legs dark fuscous, hairs of posterior tibiæ whitish-ochreous. Forewings shining whitish-ochreous; a dark fuscous costal streak from base to middle; sometimes traces of a fuscous dorsal spot before middle; an inwardly oblique subcostal spot at $\frac{2}{3}$, and an irregular tornal spot dark fuscous, variable in development, sometimes little marked: cilia whitish-ochreous, yellow-tinged. Hindwings dark fuscous, slightly purplish-tinged; cilia whitish-ochreous, more or less infuscated towards base.

Albany, West Australia; in September and October, seven specimens.

212. *H. heterospila*, n.sp.

♂. 9 mm. Head, palpi, and antennæ whitish. Thorax shining bronze. Abdomen grey. Legs grey, posterior pair suffused with whitish. Forewings bright shining bronze; a white spot on fold before middle; a white inwardly oblique fascia-like spot from costa at $\frac{2}{3}$, reaching half across wing; a small white tornal spot; a white terminal fascia, narrowed beneath: cilia bronzy-grey. Hindwings grey, darker posteriorly; cilia grey.

Albany, West Australia; in December, one specimen.

213. *H. tritocosma*, n.sp.

♂♀. 7-12 mm. Head and thorax greyish-bronze, sides of collar whitish. Palpi whitish. Antennæ grey. Abdomen dark grey. Legs dark grey, hairs of posterior tibiæ whitish. Forewings shining bronze, in ♀ deeper and posteriorly suffused with

coppery-purple; three rather irregular straight white fasciæ, first at $\frac{1}{4}$, in male not reaching above middle, in ♀ entire, second slightly beyond middle, third about $\frac{4}{5}$, rather inwardly oblique: cilia grey, basal half in ♂ silvery-grey-whitish, in ♀ deep coppery-bronze. Hindwings dark grey, purplish-tinged; cilia grey.

Albany, West Australia; in September and October, nine specimens.

214. *H. acrozona*, n.sp.

♂. 11-14 mm. Head and thorax greyish-bronze, sides of collar whitish. Palpi whitish. Antennæ grey. Abdomen dark grey. Legs dark grey, hairs of posterior tibiæ whitish. Forewings light shining bronze; a straight inwardly oblique white fascia beyond middle; a white terminal fascia: cilia pale grey, towards base whitish-suffused. Hindwings rather dark grey, purplish-tinged; cilia pale whitish grey, yellowish-tinged.

Albany, West Australia; in September and October, seventeen specimens.

215. *H. semicuprea*, n.sp.

♂. 11-12 mm. Head and thorax dark bronzy-fuscous. Palpi fuscous, towards base whitish. Antennæ, abdomen, and legs dark fuscous, hairs of posterior tibiæ grey. Forewings deep shining coppery-bronze, more or less suffused with purple, especially posteriorly; a narrow vertical inwardly oblique pale yellowish fascia at $\frac{3}{5}$: cilia fuscous, basal half suffused with coppery-bronze. Hindwings dark purple-fuscous; cilia fuscous.

Sydney and Bathurst (2000 feet), New South Wales; from September to November, five specimens.

216. *H. monosema*, n.sp.

♂. 8 mm. Head and thorax shining bronze. Palpi fuscous, base whitish. Antennæ, abdomen, and legs dark fuscous, posterior legs suffused with whitish. Forewings bright shining bronze; an undefined inwardly oblique white fascia near before apex: cilia fuscous, basal half shining bronze. Hindwings dark grey; cilia grey.

Albany, West Australia; in October, one specimen.

217. *H. porphyropla*, n.sp.

♀. 11 mm. Head and thorax dark purplish-fuscous, collar orange. Palpi fuscous. Antennæ, abdomen, and legs dark fuscous. Forewings bright shining bronze, densely irrorated with deep blue-purple: cilia dark fuscous, basal half bronze mixed with purple. Hindwings dark purple-fuscous; cilia dark fuscous.

Albany, West Australia; in September, one specimen.

218. *H. electritis*, n.sp.

♂♀. 10-14 mm. Head and thorax fuscous-bronze, crown posteriorly orange to grey-whitish. Palpi whitish. Antennæ, abdomen, and legs dark fuscous, posterior legs suffused with whitish. Forewings bright shining golden-bronze, tinged with coppery-purple, more strongly in ♀, especially posteriorly: cilia fuscous, basal half in ♂ shining bronze, in ♀ deep purple. Hindwings dark grey, purple-tinged; cilia grey.

Perth, West Australia; in October, fourteen specimens.

219. *H. chalcolitha*, n.sp.

♂♀. 12-15 mm. Head and thorax pale shining yellowish-bronze. Palpi fuscous, towards base whitish. Antennæ and abdomen grey. Legs dark grey, hairs of posterior tibiæ grey-whitish. Forewings and cilia pale shining golden-bronze. Hindwings in ♂ grey, in ♀ dark purple-grey; cilia in ♂ light ochreous-grey, in ♀ dark grey.

Albany, West Australia; in October, four specimens.

220. *H. niphochalca*, n.sp.

♂♀. 12-15 mm. Head and thorax very pale shining grey-bronze, sprinkled with whitish. Palpi fuscous, towards base whitish. Antennæ and abdomen grey. Legs dark grey, hairs of posterior tibiæ grey-whitish. Forewings and cilia shining whitish-bronzy-grey. Hindwings grey, in ♀ somewhat darker; cilia in ♂ ochreous-grey-whitish, in ♀ grey.

York, West Australia; in October, two specimens.

221. *H. philomacha*, n.sp.

♂. 8-11 mm. Head and thorax shining fuscous-bronze. Palpi dark fuscous, towards base whitish. Antennæ, abdomen, and legs dark fuscous, hairs of posterior tibiæ whitish. Forewings shining bronze, sometimes slightly purplish-tinged: cilia fuscous, basal half bronze. Hindwings dark fuscous, sometimes purple-tinged; cilia rather dark fuscous.

Perth and Albany, West Australia; in October and December, two specimens.

222. *H. panchalca*, n.sp.

♀. 6 mm. Head, palpi, antennæ, thorax, abdomen, and legs shining fuscous-bronze. Forewings bright shining fuscous-bronze, posteriorly purple-tinged, with scattered pale golden-shining scales: cilia rather dark fuscous. Hindwings dark fuscous; cilia rather dark fuscous.

Brisbane, Queensland; in September, one specimen.

223. *H. phaeochalca*, n.sp.

♂. 8 mm. Head, antennæ, thorax, abdomen, and legs shining fuscous-bronze, hairs of posterior tibiæ whitish. Forewings shining fuscous-bronze, irrorated with dark fuscous: cilia fuscous. Hindwings dark purplish-fuscous; cilia fuscous.

Bathurst (2000 feet), New South Wales; in November, one specimen, without palpi, which I suppose to be broken off. I have also a much damaged specimen, without head, apparently of the same species but not certainly identical, taken at Sydney in July.

224. *H. peristera*, n.sp.

♂♀. 7-8 mm. Head, antennæ, and thorax shining bronzy-grey. Palpi grey, towards base whitish. Abdomen and legs dark grey, hairs of posterior tibiæ whitish. Forewings and cilia pale shining bronzy-grey. Hindwings rather dark purplish-fuscous; cilia fuscous.

Sydney, New South Wales; in September, four specimens.

31. LOZOSTOMA, Staint.

Forehead with a more or less raised fillet between antennæ. Antennæ $\frac{4}{5}$, in ♂ minutely ciliated, basal joint with small apical scale-tooth. Labial palpi moderate, porrected or diverging, somewhat loosely scaled anteriorly, terminal joint shorter than second, somewhat obtusely pointed. Posterior tibiæ rough-haired, median spurs much above middle, inner very long. Forewings: 1b simple, 3 sometimes obsolete, 5 out of 7, nearly obsolete, 6 out of 7, 7 to costa, 8 absent, 9 out of 7, cell sometimes open between 9 and 11. Hindwings $\frac{2}{3}$, elongate-lanceolate, cilia 3; transverse vein and upper margin of cell largely obsolete, veins all separate.

A genus probably of moderate extent, characteristic of the Indo-Malayan and Australian regions. Imago with forewings lanceolate, long-pointed. The larval habits are at present quite unknown, though some of the species are plentiful.

- | | |
|---|-----------------------------|
| 1. Crown of head yellow or whitish-ochreous..... | 2. |
| Crown of head fuscous or dark fuscous..... | 6. |
| 2. Thorax wholly dark fuscous..... | 3. |
| Thorax mostly yellowish..... | 4. |
| 3. Forewings with dark fuscous dorsal streak from base..... | 225. <i>scalena</i> . |
| Forewings without such streak..... | 226. <i>comptella</i> . |
| 4. Fillet fuscous..... | 228. <i>stereodeta</i> . |
| Fillet whitish-yellowish..... | 5. |
| 5. Forewings with yellowish spot on middle of costa.. | 235. <i>nebularis</i> . |
| Forewings without such spot..... | 234. <i>stenocraspeda</i> . |
| 6. Posterior dark area reduced to a terminal streak... | 7. |
| Posterior dark area extending to costa beyond middle..... | 8. |
| 7. Prominence of terminal streak reaching half across wing..... | 232. <i>micranthes</i> . |
| Prominence of terminal streak reaching $\frac{2}{3}$ across wing..... | 233. <i>tristicta</i> . |
| 8. Forewings with yellow anteapical costal spot.... | 9. |
| Forewings without such spot.... | 10. |
| 9. Thorax posteriorly yellowish..... | 230. <i>orthotis</i> . |
| Thorax wholly dark fuscous..... | 227. <i>cleonyma</i> . |
| 10. Back of fillet light ferruginous..... | 231. <i>protodoxa</i> . |
| Back of fillet not ferruginous..... | 229. <i>retractella</i> . |

225. *L. scalena*, n.sp.

♂♀. 14-16 mm. Head pale ochreous-yellowish. Palpi dark fuscous. Antennæ whitish-ochreous. Thorax dark purplish-fuscous. Legs whitish-ochreous, banded with fuscous. Forewings yellow; thick dark purplish-fuscous costal and dorsal streaks, meeting at base; posterior half beyond a sinuate inwardly oblique line wholly dark purplish-fuscous, except a rather large pale yellow roundish costal spot before apex, and small ill-defined pale yellow tornal spot: cilia light ochreous-fuscous, opposite costal and tornal spots pale yellow. Hindwings coppery-yellowish-fuscous; cilia coppery-yellowish, round apex fuscous-tinged.

Mount Lofty, South Australia, in November and December; two specimens received from Mr. E. Guest, who mentions it as locally common.

226. *L. comptella*, Walk.

(*Tinea comptella*, Walk. Tin. 1007.)

♂♀. 13-15 mm. Head pale yellow. Palpi dark fuscous. Antennæ whitish-ochreous, basal joint dark fuscous. Thorax dark purplish-fuscous. Abdomen fuscous. Legs dark fuscous, posterior pair lighter. Forewings yellow; a dark purplish-fuscous costal streak from base to near $\frac{2}{5}$, at base reaching dorsum; posterior half beyond a sinuate inwardly oblique line wholly dark purplish-fuscous, except rather large pale yellow spots on costa before apex and at tornus: cilia ochreous-fuscous, opposite costal and tornal spots pale yellow. Hindwings coppery-yellowish-fuscous, darker terminally; cilia coppery, round apex more infuscated.

Cooma (3000 feet), New South Wales; Melbourne, Victoria; Launceston and Hobart, Tasmania; in January, eight specimens. The two Melbourne specimens which I possess have the costal streak shorter and finely attenuated posteriorly, but even if found to be constant, the difference could only be held to indicate a local form.

227. *L. cleonyma*, n.sp.

♂♀. 10-14 mm. Head and antennæ whitish-ochreous, crown purplish-fuscous. Palpi dark fuscous. Thorax dark purplish-

fuscous. Abdomen and legs fuscous. Forewings yellow; a dark purplish-fuscous basal fascia, more or less produced along costa; posterior half beyond a nearly straight more or less inwardly oblique line deep ferruginous-purple, except a rather large pale yellow costal spot before apex, and a few pale yellowish scales at tornus: cilia coppery-fuscous, opposite costal spot and tornus pale yellow. Hindwings coppery-orange-fuscous; cilia coppery, round apex more infuscated.

Brisbane, Queensland; Glen Innes (3000 feet), Sydney, and Bulli, New South Wales; Melbourne and Healesville, Victoria; in September, October, December, February, and May, twelve specimens.

228. *L. stereodyta*, n.sp.

♂♀. 10-15 mm. Head yellow, face pale shining bronzy, fillet fuscous. Palpi dark fuscous. Antennæ whitish-ochreous, basal joint dark fuscous. Thorax yellow, shoulders narrowly dark fuscous. Abdomen and legs dark fuscous. Forewings bright yellow; a dark fuscous streak along basal fourth of costa; an inwardly oblique purple postmedian fascia, uniting beneath with a purple streak along termen from apex, both partially edged with dark fuscous anteriorly: cilia coppery-fuscous. Hindwings dark coppery-fuscous; cilia coppery-fuscous.

Sydney, Blackheath (3500 feet), Shoalhaven, and Mount Kosciusko (4300 feet), New South Wales; Campbelltown, Georges Bay, and Hobart, Tasmania; Mount Lofty and Port Lincoln, South Australia; Albany, West Australia; from September to March, and in June, very common.

229. *L. retractella*, Walk.

(*Oecophora retractella*, Walk. Tin. 1031.)

♀. 11 mm. Head dark purple-fuscous, face pale shining bronzy, fillet ochreous-whitish. Palpi dark fuscous. Antennæ ochreous-whitish. Thorax bronzy-fuscous. Abdomen and legs dark fuscous, posterior legs lighter. Forewings yellow; a dark fuscous basal fascia, produced along costa to $\frac{1}{4}$; terminal half

beyond a straight rather inwardly oblique line dark purplish-fuscous: cilia fuscous, costal cilia paler on a spot before apex. Hindwings dark coppery-fuscous; cilia coppery, round apex more infuscated.

Bulli, New South Wales; in January, one specimen.

230. *L. orthotis*, n.sp.

♀. 10-11 mm. Head and antennæ whitish-ochreous, crown purplish-fuscous. Palpi dark fuscous. Thorax purplish-fuscous, with a pale yellow posterior spot. Abdomen fuscous. Legs fuscous, posterior pair whitish-ochreous. Forewings light yellow; a rather thick fuscous-purple costal streak from base to $\frac{1}{3}$; posterior half beyond a nearly straight vertical line fuscous-purple, except a rather large pale yellow costal spot before apex: cilia pale yellowish. Hindwings grey; cilia whitish-yellowish.

Brisbane, Queensland; Carnarvon, West Australia; in October and November, three specimens.

231. *L. protodoxa*, n.sp.

♂♀. 10-15 mm. Head shining whitish-ochreous, crown fuscous, back of fillet light ferruginous. Palpi dark fuscous. Antennæ ochreous-whitish, basal joint dark fuscous. Thorax pale yellow, shoulders narrowly dark fuscous. Abdomen dark fuscous. Legs whitish-ochreous, anterior and middle pair suffused with dark fuscous. Forewings yellow; an attenuated dark fuscous streak along basal fourth of costa; a slightly inwards-curved very oblique black postmedian transverse line, posteriorly edged with prismatic-violet; terminal area beyond this wholly pale violet-fuscous: cilia pale fuscous. Hindwings fuscous; cilia pale fuscous, ochreous-tinged.

Rosewood, Queensland; Sydney, Bulli, and Bathurst, New South Wales; Healesville, Victoria; Launceston, Campbelltown, and Hobart, Tasmania; Mount Lofty, South Australia; from September to January, very common.

232. *L. micranthes*, n.sp.

♂♀. 8-11 mm. Head shining whitish, crown dark fuscous. Palpi dark fuscous. Antennæ whitish, basal joint dark fuscous. Thorax pale yellow, shoulders narrowly dark fuscous. Abdomen silvery-grey-whitish. Legs silvery-whitish, anterior pair dark fuscous. Forewings pale yellow; a dark fuscous streak along basal fourth or third of costa; a light purplish-fuscous irregular streak from before tornus along termen to apex, upper edge rather prominent above tornus, where it reaches half across wing, before this edged anteriorly with blackish: cilia whitish-fuscous, on costa pale yellowish. Hindwings fuscous; cilia whitish-fuscous, ochreous-tinged.

Brisbane, Queensland; Newcastle and Sydney, New South Wales; Melbourne, Victoria; from June to March, common.

233. *L. tristicta*, n.sp.

♀. 12-13 mm. Head shining whitish-ochreous, crown fuscous. Palpi whitish. Antennæ ochreous-whitish. Thorax yellow, anterior margin narrowly dark fuscous. Abdomen shining grey. Legs ochreous-whitish, anterior pair suffused with dark fuscous. Forewings deep yellow; a dark fuscous streak along basal sixth of costa; a rather light purplish-fuscous fascia from before tornus along termen to apex, upper edge prominent above tornus, where it reaches $\frac{2}{3}$ across wing, before this edged by an oblique row of three black dots, the uppermost resting on the prominent angle: cilia light fuscous, ochreous-tinged, on costa yellowish. Hindwings rather dark fuscous; cilia fuscous, coppery-tinged.

Duaringa, Queensland; two specimens received from Mr. G. Barnard.

234. *L. stenocraspeda*, n.sp.

♂♀. 9-11 mm. Head whitish-yellowish. Palpi whitish, apex of joints fuscous. Antennæ ochreous-whitish, basal joint dark fuscous. Thorax whitish-yellowish, shoulders narrowly dark fuscous. Abdomen shining grey. Legs ochreous-whitish, anterior pair suffused with dark fuscous. Forewings pale ochreous-

yellowish; a broad rather dark fuscous costal streak from base to $\frac{3}{4}$; a slender fuscous streak from before tornus along termen to apex, upper edge somewhat prominent above tornus, where it reaches $\frac{1}{3}$ across wing, before this edged with three black dots: cilia whitish-fuscous, on costa whitish-yellowish. Hindwings fuscous; cilia whitish-fuscous.

Newcastle and Sydney, New South Wales; Launceston, Campbelltown, and Deloraine, Tasmania; from June to March, ten specimens.

235. *L. nebularis*, n.sp.

♂♀. 11-13 mm. Head whitish-ochreous. Palpi fuscous. Antennæ ochreous-whitish, basal joint dark fuscous. Thorax pale ochreous-yellowish, shoulders narrowly dark fuscous. Abdomen pale shining greyish-ochreous. Legs whitish-ochreous, anterior pair suffused with dark fuscous. Forewings purplish-fuscous, irrorated with dark fuscous; a broad pale ochreous-yellowish dorsal streak from base to tornus, narrowed posteriorly, marked with a dark fuscous dorsal spot before tornus; irregular suffused pale ochreous-yellowish costal spots at $\frac{1}{2}$ and $\frac{3}{4}$, variable and sometimes tending to be confluent in disc: cilia whitish-ochreous, with a few fuscous scales. Hindwings grey; cilia whitish-ochreous.

Sydney and Bulli, New South Wales; from November to January, eight specimens.

32. *ERETMOCERA*, Zell.

Antennæ almost 1, basal half thickened with scales, becoming long and roughly projecting on back towards middle. Labial palpi moderately long, recurved, loosely rough-scaled anteriorly, terminal joint almost as long as second, acute. Abdomen very broad, flattened, apical segment with lateral tufts of scales. Posterior tibiæ smooth-scaled. Forewings: 1b simple, 6 and 7 stalked, 7 to costa, 8 absent. Hindwings $\frac{2}{3}$, elongate-lanceolate, cilia 2; costa towards base with fringe of rough scales drawn over wing; veins all separate.

A small genus, especially characteristic of the Indo-Malayan and African regions. Imago with forewings elongate, narrow, long-pointed, costa somewhat sinuate; the species are often conspicuously ornamented with red or yellow.

236. *E. chrysias*, Meyr. .

(*Castorura chrysias*, Meyr., Proc. Linn. Soc. N.S.W. 1886, 1047; *Eretmocera chrysias*, Wals., Trans. Ent. Soc. Lond. 1889, 35, pl. vi, 19.)

♂♀. 12-13 mm. Head and thorax deep shining bronze. Palpi dark fuscous, towards base ochreous-yellowish. Antennæ purple-blackish. Abdomen orange, with a purple-blackish band before middle, extending over two segments, anal tuft dark fuscous. Legs dark purple-fuscous, posterior tibiæ with orange basal band. Forewings purple-blackish; four roundish orange or pale yellowish spots, first on dorsum at $\frac{1}{4}$, second in disc before middle, third before tornus, fourth on costa at $\frac{3}{4}$: cilia dark fuscous. Hindwings dark fuscous, suffused with deep yellow towards basal half of termen, or sometimes wholly throughout; cilia dark fuscous, from base to beyond middle of termen ochreous-yellow except towards tips.

Duaringa and Maryborough, Queensland, from February to April; four specimens received from Mr. G. Barnard.

33. TINAGMA, Zell.

Antennæ $\frac{3}{2}$, in ♂ simple. Labial palpi rather long, recurved, second joint towards apex and terminal joint clothed in front with rather long rough projecting scales, terminal joint shorter than second, acute. Posterior tibiæ smooth-scaled. Forewings: 1b furcate, 6 and 7 stalked, 7 to costa, 8 absent, 9 out of 7 near base. Hindwings $\frac{3}{2}$, lanceolate, cilia 3; 2 absent, 4 absent, transverse vein absent between 3 and 5, 7 absent.

Besides the following, I am only acquainted with a very few species from South Europe, but probably the genus is represented in the intermediate regions. The Australian species differs in some points of neuration from the European, but the general

agreement is so marked that I see no cause for separation; the description given above applies fully to the Australian species only. Imago with forewings lanceolate; all the species have the habit of holding up the wings and vibrating them with a fanning action, somewhat as in *Glyphipteryx*.

237. *T. leucanthes*, n.sp.

♂♀. 5-6 mm. Head fuscous, face whitish beneath. Palpi whitish, second joint with one, terminal with two dark fuscous rings. Antennæ whitish, ringed with dark fuscous. Thorax dark bronzy-fuscous. Abdomen dark fuscous, segmental margins silvery-shining, anal tuft white. Legs dark fuscous ringed with white. Forewings dark bronzy-fuscous; a straight rather narrow shining white median fascia; in ♂ a shining white costal spot at $\frac{4}{5}$, and opposite dot at tornus, in ♀ a fine straight fascia at $\frac{4}{5}$; cilia dark bronzy-fuscous, with white spots opposite costal and tornal spots, and terminal half sharply white from apex to above tornus. Hindwings dark fuscous; cilia grey. Hindwings beneath with whitish median and anteapical fasciæ.

Sydney, New South Wales; in April, three specimens.

34. *Scythris*, Hüb.

Antennæ $\frac{4}{5}$, in ♂ shortly ciliated. Labial palpi rather long, curved, ascending, second joint smooth-scaled, terminal shorter, acute. Posterior tibiæ rough-haired. Forewings: 1b shortly furcate or simple, 6 and 7 stalked; 7 to costa, 8 absent. Hindwings $\frac{3}{4}$ to $\frac{2}{3}$, lanceolate, cilia 2-4; veins all separate (in Australian species).

A considerable genus, apparently cosmopolitan, but most numerous in Southern Europe. Imago with forewings elongate-lanceolate, sometimes somewhat caudate; the species are usually rather sluggish in habit and easily overlooked. Larva usually in a slight web or silken tubes amongst shoots or stems, but in the Australian species still unknown.

- | | |
|--|---------------------------|
| 1. Antennæ with white band above middle..... | 240. <i>ceratocosma</i> . |
| Antennæ without white band..... | 2. |

- | | |
|---|----------------------------|
| 2. Forewings with sharply defined ochreous-white median streak..... | 3. |
| Forewings without such streak..... | 4. |
| 3. Forewings with a white streak running into costal cilia..... | 239. <i>pleonectis</i> . |
| Forewings without such streak..... | 238. <i>rhabducha</i> . |
| 4. Forewings with white bar from costa at $\frac{2}{3}$ | 245. <i>plocanota</i> . |
| Forewings without white costal bar..... | 5. |
| 5. Forewings with undefined whitish median streak from base..... | 243. <i>sporadica</i> . |
| Forewings without such streak..... | 6. |
| 6. Forewings with fine white line along fold nearly throughout..... | 241. <i>cryptogramma</i> . |
| Forewings without such line..... | 7. |
| 7. Forewings with whitish bar from tornus..... | 246. <i>erebospila</i> . |
| Forewings without whitish bar from tornus..... | 8. |
| 8. Forewings with dark discal spot at $\frac{2}{3}$, followed by a whitish spot..... | 242. <i>adelopa</i> . |
| Forewings without such spot..... | 244. <i>paredra</i> . |

238. *S. rhabducha*, n.sp.

♂. 12-13 mm. Head, palpi, antennæ, thorax, abdomen, and legs dark fuscous, faintly purplish-tinged; palpi white towards base; abdomen white beneath and on a lateral streak; legs white beneath. Forewings and cilia dark fuscous, faintly tinged with bluish-purple; a sharply marked narrow median longitudinal ochreous-white streak from base to $\frac{2}{3}$, apex somewhat dilated. Hindwings and cilia dark fuscous.

Melbourne, Victoria; two specimens received from Rev. G. H. Raynor.

239. *S. pleonectis*.

♂. 13 mm. Differs from *S. rhabducha* as follows: forewings with median streak broader, reaching $\frac{4}{5}$, from above extremity of which proceeds a white streak into costal cilia above apex.

Melbourne, Victoria; one specimen received from Rev. G. H. Raynor. This may very possibly be only a variety of the preceding; but as the distinction is so well-marked, I have separated them until further material is forthcoming.

240. *S. ceratocosma*, n.sp.

♂♀. 10-11 mm. Head, palpi, antennæ, thorax, abdomen, and legs dark fuscous, faintly purplish-tinged; base of palpi whitish; antennæ with a broad white band above middle; abdomen white beneath except towards base; legs partially white beneath. Forewings dark fuscous, faintly purplish-tinged, thinly irregularly strewn with ochreous-whitish scales; the confluence of these tends to form indistinct whitish spots on dorsum at $\frac{1}{4}$, on tornus, and two others in disc between these, separated by three undefined dark spaces of clear groundcolour: cilia dark fuscous, sometimes with a few ochreous-whitish scales round apex. Hindwings and cilia dark fuscous.

Sydney, New South Wales; Healesville, Victoria; in October and November, three specimens.

241. *S. crypsigramma*, n.sp.

♀. 9 mm. Head, palpi, antennæ, thorax, abdomen, and legs shining dark fuscous; palpi with second joint white except apex, terminal joint white above; abdomen and legs white beneath. Forewings shining dark grey, faintly purplish-tinged, obscurely streaked with black on veins; a very fine white line along fold from base to near tornus: cilia dark grey, round apex with a few pale scales. Hindwings and cilia dark fuscous.

Geraldton, West Australia; in November, one specimen.

242. *S. adelopa*, n.sp.

♂♀. 11-13 mm. Head and thorax fuscous irrorated with white. Palpi dark fuscous, apex of joints whitish. Antennæ grey. Abdomen grey, beneath whitish. Legs dark fuscous, irrorated with white. Forewings fuscous, irrorated with white; an indistinct dark fuscous spot in disc at $\frac{2}{5}$, followed by a whitish spot, sometimes extended as an inwardly oblique whitish bar to dorsum; two indistinct dark fuscous dots on fold beyond this, sometimes separated with whitish, two others in disc above them,

and one in disc at $\frac{3}{4}$: cilia pale greyish-ochreous. Hindwings grey; cilia pale greyish-ochreous.

Carnarvon, West Australia; in October, seven specimens.

243. *S. sporadica*, n.sp.

♂♀. 10-11 mm. Head and thorax bronzy-fuscous, somewhat whitish-mixed. Palpi dark fuscous, base whitish. Antennæ fuscous. Abdomen rather dark bronzy-fuscous, beneath whitish-ochreous. Legs fuscous, ringed with whitish-ochreous, hairs of posterior tibiæ whitish-ochreous. Forewings bronzy-fuscous mixed with whitish-ochreous; an undefined broad median streak of whitish suffusion or irroration from base to about $\frac{3}{4}$; undefined cloudy blackish spots on fold at $\frac{1}{3}$, $\frac{1}{2}$, and $\frac{3}{4}$, separated with whitish, and in disc at $\frac{3}{4}$: cilia fuscous. Hindwings dark fuscous; cilia fuscous.

Sydney, New South Wales; Healesville, Victoria; in October and November, three specimens.

244. *S. paredra*, n.sp.

♂♀. 9-10 mm. Head, antennæ, and thorax bronzy-fuscous. Palpi fuscous above, whitish beneath. Abdomen bronzy-fuscous, beneath whitish-ochreous. Legs fuscous, hairs of posterior tibiæ whitish-ochreous. Forewings bronzy-fuscous, more or less sprinkled with whitish-ochreous; very indistinct darker spots on fold at $\frac{1}{3}$ and $\frac{1}{2}$, separated by a fine whitish dash, and in disc at $\frac{3}{4}$: cilia brownish-ochreous. Hindwings grey; cilia brownish-ochreous.

Sydney, New South Wales; Wirrabara, South Australia; in October and January, five specimens.

245. *S. plocanota*, n.sp.

♂. 9-10 mm. Head, antennæ, and thorax fuscous, sides of crown whitish, apex of patagia clear white. Palpi rather dark fuscous, towards base whitish, extreme apex of joints whitish. Abdomen coppery-fuscous, beneath whitish-ochreous. Legs dark fuscous, ringed with whitish. Forewings dark fuscous, irrorated with whitish; an irregular rather oblique white bar from costa at

$\frac{2}{3}$, reaching $\frac{2}{3}$ across wing, followed in disc by a spot of blackish suffusion; a whitish spot on fold beyond middle, and another obliquely beyond and above it, more or less confluent, each followed by an indistinct blackish spot: cilia fuscous, at apex with a spot of whitish scales. Hindwings dark fuscous; cilia fuscous.

Rosewood and Brisbane, Queensland; in September, two specimens.

246. *S. erebospila*, n.sp.

♂. 8 mm. Head, palpi, antennæ, thorax, abdomen, and legs dark bronzy-fuscous; base of palpi whitish; abdomen and legs whitish beneath. Forewings dark bronzy-fuscous, with a few whitish scales in disc; a cloudy spot in disc beyond $\frac{1}{4}$, another at $\frac{1}{2}$, an irregular bar from tornus reaching more than half across wing, and some scales on costa beyond this dull whitish: cilia dark bronzy-fuscous, at apex with a dull whitish basal spot. Hindwings and cilia dark fuscous.

Springwood, New South Wales; in November, one specimen.

35. ENDROSIS, Hüb.

Antennæ $\frac{3}{4}$, in ♂ fasciculate-ciliated ($2\frac{1}{3}$). Labial palpi long, recurved, second joint smooth, terminal as long, acute. Posterior tibiæ rough-haired. Forewings: 1b imperfectly furcate, 7 and 8 stalked, 7 to costa. Hindwings under 1, ovate-lanceolate, with transparent subbasal patch, cilia 2; 3 and 4 connate or short-stalked, 6 absent.

Contains only the one species, now domesticated in houses in many parts of the world, its real origin being uncertain. Imago with forewings elongate, pointed; it is never met with except in houses, or on tree-trunks near them.

247. *E. lacteella*, Schiff.

(*Endrosis lacteella*, Schiff, Meyr. Trans. N.Z. Inst. 1888, 160; *Gelechia subditella*, Walk. Tin. 657; (?) *G. adapertella*, ib. 653.)

♂♀. 14-20 mm. Head white. Thorax white, anterior edge dark fuscous. Forewings greyish-ochreous, coarsely irrorated with black, with some white scales; a white basal dot; stigmata

black, first discal much beyond plical; an indistinct whitish costal spot at $\frac{3}{4}$. Hindwings pale grey, more whitish towards base; cilia ochreous-tinged.

Glen Innes (3500 feet), Bathurst (2000 feet), Blackheath (3500 feet), and Cooma (3000 feet), New South Wales; Melbourne and Warragul, Victoria; Launceston, Campbelltown, and Deloraine, Tasmania; Kingston and Mount Lofty, South Australia; common also throughout New Zealand, and occurs in Europe, N. America, and S. Africa; from October to March, common. Larva whitish; head reddish-brown; 2 pale brown posteriorly: on seeds, dry refuse, &c., throughout the year.

36. NOTODRYAS, n.g.

Antennæ $\frac{4}{5}$, in ♂ with fine long ciliations (3). Labial palpi long, recurved, smooth-scaled, terminal joint shorter than second, acute. Posterior tibiæ rough-haired. Forewings: 1b simple, 6 out of 7, 7 to termen, 8 out of 7. Hindwings $\frac{1}{2}$, elongate-lanceolate, cilia 4; transverse vein partly absent, all veins separate.

Type *N. aeria*. Only the two following species are known; an interesting development of *Epermenia*. Imago with forewings lanceolate, apex produced.

First fascia entire..... 249. *vallata*.
First fascia not reaching costa..... 248. *aeria*.

248. *N. aeria*, n.sp.

♂♀. 9-12 mm. Head, palpi, thorax, and abdomen white. Antennæ grey, base white. Legs dark fuscous, posterior pair whitish. Forewings white; markings light ochreous-yellowish, more or less irrorated with black, more strongly towards dorsum; a small spot near base in middle; an oblique bar from dorsum before middle, reaching $\frac{2}{3}$ across wing; an oblique fascia from $\frac{3}{4}$ of costa to tornus, more or less interrupted or indistinct; a small apical spot: cilia white, with light ochreous-yellowish spots irrorated with black at apex, middle of termen, and tornus. Hindwings whitish, sometimes greyer posteriorly; cilia whitish.

Brisbane and Toowoomba, Queensland; Sydney, New South Wales; Warragul, Victoria; Deloraine, Tasmania; from September to November and in February, fourteen specimens.

249. *N. vallata*, n.sp.

♀. 8-10 mm. Head and palpi white. Antennæ grey, base white. Thorax white, variably suffused with dark fuscous. Abdomen dark grey. Legs dark fuscous, posterior pair suffused with whitish. Forewings white; two bright ferruginous fasciæ, mixed with black dorsally and sometimes black-edged in disc, first median, inwardly oblique, second opposite tornus, vertical, confluent on costa and sometimes connected in disc; ferruginous streaks from second fascia along costa and termen to apex, sometimes undefined or indistinct, sometimes terminating in an apical spot of black scales: cilia brownish-ochreous, base white, sometimes limited by a black line, sometimes with an indistinct whitish bar at apex, variable undefined spots of black irroration at apex and tornus. Hindwings dark fuscous; cilia fuscous.

Sydney, New South Wales; Gisborne, Victoria; in November, January, and March, four specimens.

37. *EPERMENIA*, Hüb.

Antennæ $\frac{4}{5}$, in ♂ evenly ciliated. Labial palpi long, curved, thickened with loose scales, terminal joint from one-fourth to half second, rather obtuse. Posterior tibiæ clothed with bristly hairs. Forewings with one or more dorsal scale-teeth; 1b furcate, 7 and 8 sometimes stalked, 7 to termen. Hindwings $\frac{3}{4}$, elongate-lanceolate, cilia 2-4; 6 and 7 approximated or stalked.

A rather small but probably nearly cosmopolitan genus, doubtless of considerable antiquity. Imago with forewings more or less narrowly elongate, pointed. Larva usually feeding in a slight web amongst spun leaves. Pupa in an open network cocoon.

1. Palpi with apical scale-projection on second joint
beneath..... 250. *eurybias*.
- Palpi without scale-projection beneath..... 2.

- | | |
|--|-------------------------|
| 2. Palpi with apical scale-projection on second joint above..... | 3. |
| Palpi without scale-projection above..... | 4. |
| 3. Forewings with white subcostal streak..... | 254. <i>aphronesa</i> . |
| Forewings without such streak..... | 251. <i>epispora</i> . |
| 4. Forewings with four dorsal scale-teeth..... | 253. <i>exilis</i> . |
| Forewings with two dorsal scale-teeth..... | 252. <i>opsias</i> . |

250. *E. eurybias*, n.sp.

♂♀. 11-15 mm. Head and thorax fuscous, more or less whitish-mixed, sometimes with an ochreous-whitish median stripe. Palpi dark fuscous, whitish-sprinkled towards base, second joint with short apical scale-projection beneath, terminal joint moderate, ascending. Antennæ and abdomen fuscous. Legs dark fuscous. Forewings moderately narrow; costa moderately arched, 7 and 8 separate; light fuscous, irregularly strigulated with dark fuscous irroration, and partially finely whitish-sprinkled; a black dot beneath costa near base, and one in disc at $\frac{1}{3}$; an undefined patch of dark fuscous suffusion on dorsum at $\frac{1}{4}$; a narrow indistinct dark fuscous inwardly oblique median fascia, marked with a small ochreous spot in disc, and terminating in a large blackish dorsal scaletooth; a black dot in disc at $\frac{3}{4}$, followed by a small ochreous spot; posterior half of costa indistinctly spotted with dark fuscous; a small ochreous apical spot: cilia light fuscous, round apex irrorated with dark fuscous and whitish, with a dark fuscous spot at apex, and a dark fuscous scaletooth before tornus. Hindwings fuscous; cilia light fuscous.

Toowoomba (2000 feet), Queensland; Glen Innes (3000 feet) and Sydney, New South Wales; Gisborne and Healesville, Victoria; Hobart, Tasmania; Wirrabara, South Australia; from June to December and in March, eighteen specimens. Larva stout, light yellow-green on back, rather dark bright green on sides, division well-marked; dorsal line rather dark green; spiracular raised, yellowish; head yellow-green, mouth brownish; in a half-grown individual 9 and half 8 flesh-coloured: feeds in a very slight web on twigs of *Exocarpus cupressiformis* (*Santalaceae*).

251. *E. epispora*, n.sp.

♂. 9-11 mm. Head, thorax, and abdomen light fuscous, somewhat whitish-mixed. Palpi fuscous, whitish-sprinkled, second joint suffused with dark fuscous towards apex, with scale projection towards apex above, terminal joint short, porrected, with a dark fuscous median ring. Antennæ fuscous. Legs fuscous, whitish-sprinkled, ringed with dark fuscous. Forewings narrow, costa gently arched, 7 and 8 stalked; fuscous, finely whitish-sprinkled, with scattered strigulae of dark fuscous scales; slender indistinct dark fuscous inwardly oblique fasciae at $\frac{1}{4}$ and $\frac{1}{2}$, latter terminating in a large dark fuscous dorsal scaletooth at $\frac{1}{3}$, and followed by a triangular dorsal white suffusion; a moderately broad ill-defined dark fuscous vertical fascia at $\frac{2}{3}$, marked with an ochreous spot in disc, and terminating in a dark fuscous tornal scaletooth; a black discal dot at $\frac{3}{4}$, partly white-edged; costa posteriorly spotted with dark fuscous: cilia light fuscous, round apex irrorated with dark fuscous and whitish, with a dark fuscous spot at apex. Hindwings fuscous; cilia light fuscous.

Toowoomba, Queensland; Sydney, New South Wales; in November and December, three specimens.

252. *E. opsias*, n.sp.

♂♀. 10-14 mm. Head and thorax pale grey mixed with whitish. Palpi dark grey, second joint whitish towards base, without scale-projection, terminal joint short, tip whitish. Antennæ grey. Abdomen whitish-grey. Legs dark grey, whitish-sprinkled, ringed with dark fuscous and whitish. Forewings narrow, costa gently arched, 7 and 8 separate; fuscous, suffusedly irrorated with white, with scattered black scales; sometimes a small black spot beneath fold at $\frac{1}{5}$; black dots beneath costa at $\frac{1}{5}$ and $\frac{2}{5}$, one in disc between these, one on fold before middle, one in middle of disc often forming a short oblique transverse mark, one in disc beyond middle, and one at $\frac{3}{4}$; minute black dorsal scaleteeth before and beyond middle: cilia whitish-grey, sometimes ochreous-tinged, at apex with a blackish spot, and sometimes much irrorated with black. Hindwings grey; cilia whitish-ochreous-grey.

Bathurst (2000 feet), Blackheath (3500 feet), and Mount Kosciusko (4500 feet), New South Wales; Deloraine, Tasmania; from November to March, ten specimens.

253. *E. exilis*, n.sp.

♂♀. 10-13 mm. Head, thorax, and abdomen fuscous mixed with whitish. Palpi fuscous, whitish-sprinkled, second joint without scale-projection, terminal joint and apical band of second dark fuscous, terminal joint rather short, apex whitish. Antennæ fuscous. Legs fuscous, ringed with dark fuscous and whitish. Forewings very narrow, costa slightly arched, 7 and 8 stalked; fuscous, mixed with whitish, irregularly irrorated or strigulated with dark fuscous; a narrow indistinct dark fuscous inwardly oblique fascia before middle; a black dot in disc before this, and another at $\frac{3}{4}$, beyond which is an indistinct ochreous spot; four small equidistant black dorsal scaleteeth, first at $\frac{1}{3}$, fourth at tornus; a black costal dot towards apex: cilia pale greyish-ochreous, round apex irrorated with blackish. Hindwings light grey; cilia pale greyish-ochreous.

Sydney, New South Wales; Adelaide, Wirrabara, and Port Lincoln, South Australia; in June, July, and from October to December, ten specimens.

254. *E. aphronesa*, n.sp.

♂. 14 mm. Head, thorax, and abdomen light brownish mixed with whitish. Palpi fuscous, apex of second and terminal joints whitish, second joint with projecting scales towards apex above, terminal joint very short. Antennæ fuscous. Legs fuscous, ringed with dark fuscous and whitish. Forewings narrow, costa gently arched, 7 and 8 separate; light brown, reddish-tinged, sprinkled with whitish and dark fuscous; a broad undefined white subcostal streak from beneath costa near base to costa at $\frac{4}{5}$; an oblique irregular blackish bar from costa at $\frac{1}{5}$, reaching to fold; a black dot beneath costa at $\frac{2}{5}$, one in disc close beyond bar, one on fold before middle followed by a ferruginous spot, one in disc

beyond middle, one at $\frac{3}{4}$ edged with white, and one on costa beyond $\frac{4}{5}$; blackish dorsal scale-teeth before and beyond middle; a round blackish apical spot, preceded by a white costal spot; cilia whitish-ochreous, with a ferruginous-brown patch on basal half beneath apex, a dark fuscous terminal spot at apex, and another beneath it. Hindwings pale grey; cilia whitish-grey-ochreous.

Tasmania, exact locality unrecorded; one specimen received from Rev. G. H. Raynor.

APPENDIX.

The following species was referred by Walker in error to a genus of this family, and is merely quoted to explain its absence.

255. *Elachista lativittella*, Walk. Tin. 898. Belongs to *Tinea* (*Tineidae*).

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<i>porphyropla</i>	217.	<i>trimeris</i>	22.
<i>prodela</i>	195.	<i>triselena</i>	34.
<i>promacha</i>	98.	<i>trisema</i>	116.
<i>protodoza</i>	231.	<i>trisphaera</i>	199.
<i>psammodes</i>	174.	<i>trissodesma</i> , Low.....	127.
<i>psarotricha</i>	153.	<i>tristicta</i>	233.
<i>psoralea</i>	161.	<i>tritocosma</i>	213.
<i>pyrrhodes</i>	95.	<i>trivincta</i>	104.
<i>retractella</i> , Walk.....	229.	<i>trizona</i>	204.
<i>rhabducha</i>	238.	<i>tropaea</i>	167.
<i>scalena</i>	225.	<i>vallata</i>	249.
<i>schismatias</i>	86.	<i>velox</i>	2.
<i>scoliosema</i>	126.	<i>volucris</i>	14.
<i>sedula</i>	151.	<i>zanthodisca</i>	205.
<i>selenura</i>	166.	<i>zanthoma</i>	49.
<i>semicuprea</i>	215.	<i>zenadelpha</i> , Meyr.....	32.

NOTE ON THE OCCURRENCE OF SPONGE REMAINS IN THE LOWER SILURIAN OF NEW SOUTH WALES.

By W. S. DUN.

Until last year it was thought that fossiliferous rocks of Lower Silurian age did not occur within the geographical boundaries of New South Wales. Mr. J. E. Carne, who was then making a geological examination of the south-eastern border country, came across extensions, from Victoria, of the graptolite-bearing slates. From several localities in the County of Wellesley he collected numerous specimens of a blue-black slate showing in great number rather indistinct remains of Graptolites. These remains were, unfortunately, rather unsatisfactory, being preserved as white films, showing only the outlines of the colonies. A preliminary note on these has already been published,* and tentative specific names have been given to some of the forms. As will be seen from the list, the forms belong chiefly to *Diplograptus* :—

Dicranograptus furcatus, Hall.

Dicellograptus extensus, Hall.

„ sp.

Didymograptus (?) *caduceus*, Salter).

Diplograptus, cf. *mucronatus*, Hall.

„ cf. *rectangularis*, McCoy.

„ cf. *palmeus*, Barrande.

Phyllograptus (?).

Climacograptus.

It has already been pointed out by Mr. T. S. Hall that the general facies of the graptolite fauna of Ordovician slates in north-eastern Gippsland would appear to point to the rocks being of a more recent age than the slates containing *Phyllograptus*, &c., in the Castlemaine and Bendigo District.† It is, I think,

* Records Geol. Survey N.S. Wales, 1897, v. Pt. 3, pp. 124-127.

† Proc. R. Soc. Vict., 1897, ix. (N.S.), pp. 183-186.

almost certain that the County Wellesley beds are of the same age as those whose contents were examined by Mr. Hall

In April, 1897, Mr. Carne made a further collection from Stockyard Creek, Parish Alexander, County of Wellesley, and it was found that besides the graptolites already recorded—*Dicranograptus furcatus*, Hall, *Diplograptus* cf. *palmeus*, Barr, *D.* cf. *rectangularis*, McCoy, *Dicellograptus extensus*, Hall, *D.* sp., *Olimacograptus* sp.—there were four specimens of the bluish slate showing evidence of sponge structure. The skeletons, as is so often the case with Lower Silurian sponge remains, are pyritised, and though little of the detail can be seen it would appear to be a form of *Protospongia*. No trace of the individual structure of the hexactinellid skeleton spicules can be made out, the body mass being represented by an irregular reticulation of very delicate lines of pyrites, so thin that a lens is useless. The general form of the sponge was probably like that of *Protospongia cyathiformis*, Dawson and Hinde, from the Cambro-Silurian of Little Metis River, Canada*. It is of elongated oval shape, about one and a half inches long as preserved. The regular tetragonal disposition of spicules and their cruciform appearance typical of *Protospongia* is not seen. At one end, the lower, can be seen the remains of the long, simple anchoring spicules. In one case seven long ones, inserted for a considerable distance into the body mass, are preserved. The top, with the osculum, is not well preserved, so that it is impossible to say whether, as in the case of *P. cyathiformis*, there are any protective spicules present.

Mr T. S. Hall has already recorded two species of *Protospongia*, *P. reticulata* and *cruciformis*, from Bendigo.† These forms present the typical arrangement of spicules in almost rectangular lattice structure.

* Trans. R. Soc. Canada, 1889, vii p. 43, fig. 13.

† Proc. R. Soc. Vict., 1889, i. (N.S.), pp. 60-61, Pl. 4.

DESCRIPTIONS OF TWO NEW SPECIES OF
PULTENÆA.

BY R. T. BAKER, F.L.S., ASSISTANT CURATOR TECHNOLOGICAL
MUSEUM, SYDNEY.

(Plate xvi.)

PULTENÆA DEANEI, sp. nov.

An erect, divaricate villous shrub, with terete branches almost hidden by the numerous leaves. Leaves on short petioles of about 1 line long, obovate, cuneate, obtuse, 4 to 6 lines long, margins slightly incurved, trinerved and reticulate on the under-side, midrib not very distinct on the upper surface, hairy on both sides. Stipules prominent, nearly 3 lines long, subulate. Flowers terminal, with small floral leaves on the calyx. Bracteoles inserted on the calyx, acuminate. Calyx villous, 4 lines long or more, lobes rather longer than the tube, the upper ones broad, acute, united to the middle. Standard 6 lines long, the lower petals shorter, keel almost truncate; all the petals light yellow. Ovary glabrous, with a tuft of white, rigid hairs at the summit. Pod unknown.

Hab.—Peat's Ferry, Hawkesbury River (H. Deane): Thornleigh Cowan Creek (R. T. Baker).

This plant has long been known to Mr. H. Deane, M.A., F.L.S., who has always insisted upon its specific rank in opposition to other botanists who have placed it with *P. elliptica* in their herbaria, although its affinities with that species are not at all well marked.

Its general aspect is perhaps somewhat similar to *P. elliptica*, but a detailed examination of its parts reveals many affinities with *P. largiflorens*, so that in botanical sequence I think it should come between that species and *P. villosa*.

It resembles *P. largiflorens*, F.v.M., in the shape both of its leaves and calyx, but differs from it in indumentum, length of

stipules, its larger leaves, and petals, and larger terminal, entirely yellow flowers, and glabrous ovary.

Its affinities with *P. villosa*, Willd., are not very marked, except in indumentum and some resemblance in the shape of leaves. It is, however, a much more divaricate, rigid plant than that species.

Except from its generic characters it is hard to state where its alliance with *P. elliptica* comes in, as it differs from it (1) in its sessile floral leaves; (2) the bracteoles inserted on the calyx; (3) indumentum; (4) vestiture of calyx; (5) the shape of the lobes of the calyx; (6) length of calyx; (7) acuminate stipules; (8) petals all yellow.

PULTENÆA ACUMINATA, sp. nov.

An erect, or prostrate, virgate, low shrub, flowering when only a few inches high. Leaves irregularly opposite or in whorls of 3 or 4, or even decussate, softly pubescent when young, acuminate, rounded or cordate at the base, under 6 lines long, rigid, convex, the midrib as well as the veins prominent on both sides, scabrous above, long silky hairs on the underside, petiole about 1 line long. Stipules minute and very deciduous. Flowers pedicellate, in dense, terminal heads, much exceeding the last leaves. Bracts lanceolate with a long acuminate, subulate point, ciliate with long silky hairs, reticulations prominent on the underside, 2 to 4 lines long. Bracteoles close under the calyx, pubescent, linear, subulate, about half the length of the calyx. Calyx hairy, about 4 lines long, tube short, the two upper lobes united to the middle, acuminate, the lower ones not quite so long, but with acuminate points similar to the upper ones. Petals about as long as or a little longer than the calyx, nearly all of equal length; standard broad, dark coloured in the centre; the keel very dark, hood-shaped, obtusely lobed, the wings a shade lighter in colour. Ovary sessile, covered with long silky hairs and tapering into a subulate style.

Hab.—Ranges on the right bank of Bylong Creek, N.S.W.
(R.T.B.)

As the leaves of this species are mostly in whorls or decussate, it is allied to the species placed by Benthham under Section III. *EUCHILUS*, of this genus. In this division the species are classified according to the convexity, concavity, or flatness of the leaves, and this species having convex leaves with recurved margins similar to those of *P. cordata* and *P. rotundifolia*, I think in botanical sequence it should be placed after *P. aspalathoides*, and thus it would form a connecting link between the Sections *ACIPHYLLUM* and *EUCHILUS*, (B. Fl. II. p. 109), as it resembles the *P. aspalathoides* of the former section in its terminal heads of flowers, and also somewhat in the size and shape of its leaves.

It differs, however, from that species in having convex, opposite leaves and *not* concave alternate leaves, and the standard is also smaller.

Its most characteristic difference from *P. obcordata* and other species of this group is the shape and size of the leaves, but otherwise it resembles them in its opposite whorled leaves.

EXPLANATION OF PLATE.

Pultenæa Deanei.

Fig. 1.—Flowering twig.

Fig. 2.—Bud (enlarged).

Fig. 3.—Calyx ,,

Fig. 4.—Standard ,,

Fig. 5.—Keel ,,

Fig. 6.—Wing ,,.

NOTES AND EXHIBITS.

Mr. Baker exhibited the plants described in his paper. Also, on behalf of Mr. C. E. Finckh, of the Technological Museum, a specimen of a comparatively rare fish, *Monocentris japonicus*, Houtt., caught by a fisherman at Newcastle.

In regard to the fish exhibited by Mr. Baker, Mr. Ogilby pointed out the presence of luminous discs, which he believed were of use as traps; he also remarked that no articulation of the scales so as to form "a coat of mail" existed in Australian specimens, such as is attributed to *Monocentris japonicus*. The presence of two separate dorsal fins removes this genus from the *Berycidae*, and its nearest ally is the rare deep-sea *Anomalops*, with which it agrees also in the presence of luminous glands and of membranous interspaces between the bones of the cranium.

Mr. H. Deane showed some excellent photographs of fossil plants, to which further reference will be made on a future occasion.

Mr. Brazier sent for exhibition six specimens of *Helix vermiculata*, Müller, obtained alive by him on July 13th, 1897, on the buffalo-grass in the Waverley Cemetery. This is the first Australian record of this introduced European species, whose home is France, Spain, Italy, &c.

Mr. W. S. Dun exhibited, on behalf of the Geological Museum, a very fine natural section of *Receptaculites* from Portion 117, Parish Warroo, County Murray. The section shows that this basin-shaped sponge had a transverse diameter of about $5\frac{1}{2}$ in., a comparatively large size for the genus. The thickness of the sides is $\cdot 55$ in.; the spicules are stout, up to $\cdot 06$ of an inch in diameter. The summit and basal plates and also the large axial canal of the spicules are to be seen. The species is widely separated from *R. australis*, Salter, and is a new species.

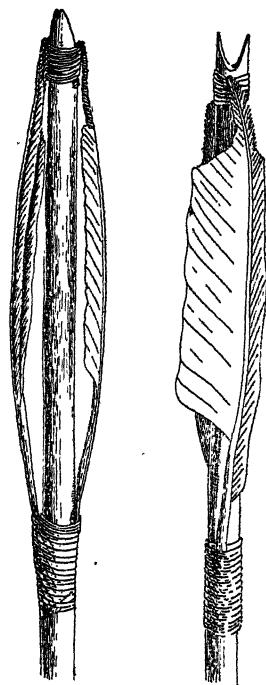
Also a portion of the core from the Buiyeroi Bore, from a depth of 886 feet, showing specimens of *Taxites medius*, Ten Woods, preserved in shale. This taxaceous plant was first found in the Ipswich Formation, Trias-Jura, of Queensland (P.L.S.N.S.W., 1888, viii. p. 160, t. 9, f. 3). The leaves are not set at so acute an angle as in the type specimen. This is the first time the species has been found in New South Wales. *Horizon*—Clarence Series = Ipswich Formation of Queensland.

Also specimens of *Protospongia* from Parish of Alexander, County Wellesley, in Lower Silurian slates.

Mr. Hedley exhibited, by permission of the Curator of the Australian Museum, a specimen of *Cancellaria granosa*, Sowerby, taken from the stomach of a schnapper hooked nine miles east of Wollongong, N.S.W., in 30-40 fathoms. An interest attached to this specimen in that though the species is well known in Tasmania, Victoria, and South Australia, it has not apparently been recorded previously from the coast of N.S.W. Mr. Hedley remarked that an exploration of the deep, cold-water current that lay off the coast would result in adding many other southern forms to our known fauna. A previous instance of such is the record [P.L.S.N.S.W. (2) iv. p. 749] of *Crassatella kingicola*, Lamk., a characteristically Tasmanian species trawled in 17 fathoms off Merimbula, N.S.W. If fishermen could be induced to search the stomachs of fishes, a mass of valuable data would soon accumulate.

Mr. Norman Hardy exhibited specimens of feathered arrows from the island of Espiritu Santo, New Hebrides, and read the following note thereon:—It has hitherto been considered that the arrows of the South Sea Islands were invariably unfeathered. This generalisation is shown to be incorrect, as I am now able to exhibit a series of feathered arrows recently collected on the island of Espiritu Santo in the New Hebrides. To find a Melanesian people practising an invention possessed by Europeans, but apparently opposed to the genius of their race, will naturally suggest that this peculiarity was derived from the whites. I am,

however, inclined to regard this sporadic occurrence of a feathered arrow as an indigenous production, not a foreign suggestion. Archery is not a sport in which European visitors or residents in these islands indulge, and it is unlikely that any European bow or arrow was ever taken to Espiritu Santo. Secondly, the mode of attaching the feather in the instance before us differs so widely from the European style as to disprove the imputation of being copied therefrom. The arrow, of which the feathered end is shown in the accompanying figures, is four feet four inches in total length; the shaft being a straight reed (*Phragmites communis*) three feet four inches long. Into this a hard-wood head, eight inches long, a third of an inch in diameter, and distally armed on one side only by four barbs, is fitted and neatly whipped at the joint by a fine, narrow, smooth fibre, probably from the stem of the banana plant. The opposite end is deeply notched for the bow string. Immediately in front of the notch the feathers are secured by a whipping of banana (?) fibre like that just described, and at a distance of four and a half inches the other, or quill, ends of the feathers are similarly secured. The feathers are pronounced by Mr. A. J. North, F.Z.S., Ornithologist to the Australian Museum, to be the primary wing feathers of the domestic fowl. The feathers preserve both inner and outer web, the broad web of one set opposite the narrow web of its fellow. Nearly half the broad web has been cut away. Instead of being closely applied and set vertically as in the European mode, the feathers are set parallel and slightly bowed from the shaft. In the instance figured the tip of the feather



is doubled over and tucked in under the lashing, in another instance the tip is simply fastened like the quill end. What the especial use of these arrows is, the bows used for them, the method of releasing the arrow, their native name and other interesting particulars still remain to be ascertained.*

Mr. North offered some remarks on the great progress made in Papuan ornithology of recent years, owing principally to the large collections formed under the direction of the present Administrator, Sir William Macgregor, K.C.M.G., during his official visits to different parts of British New Guinea. Mr. C. W. De Vis, the Curator of the Queensland Museum, who has had the pleasure of working out these collections, contributes an interesting paper to the July number of "The Ibis"† upon the novelties discovered by Mr. A. Giulianetti during his recent journey from the Mambare River to the Vanapa River, in company with Sir William Macgregor. Mr. North pointed out, however, that the specific name of the Flycatcher described by Mr. De Vis on page 375 as *Rhipidura albicauda*, was preoccupied for a Central Australian species described by himself,‡ and he therefore proposed to distinguish the White-tailed Flycatcher of British New Guinea under the name of *Rhipidura De Visi*.

Mr. North also exhibited a skin of the Freckled Duck (*Stictometta naevosa*), and remarked that specimens had been obtained during the two previous months in several parts of New South Wales, where they had not been observed for many years. Portion of a skin of one of these Ducks, shot near Toowoomba,

* P.S.—Since writing the above, I have been favoured by further information received through Mr. S. Sinclair from Dr. J. Annaud, a missionary stationed in the New Hebrides, who says of these arrows;—"They are not in ordinary use, neither are they used in any particular way."—N.H. December 2nd, 1897.

† De Vis, Ibis, p. 371, (1897).

‡ North, Ibis, p. 340. (1895).

had also been sent him for identification. Hitherto, it appeared Queensland had not been included in the habitat of this species. A set of three eggs of the Black-shouldered Kite (*Elanus axillaris*) taken on the 28th ultimo was also exhibited. Repeated attempts had been made by Crows (*Corone australis*) to drive the sitting bird off the nest, and steal the eggs. Two other nests of this Kite, examined during last month, contained young.

WEDNESDAY, 29TH SEPTEMBER, 1897.

The Ordinary Monthly Meeting of the Society was held at the Linnean Hall, Ithaca Road, Elizabeth Bay, on Wednesday evening, September 29th, 1897.

Dr. J. C. Cox, F.L.S., Vice-President, in the Chair.

DONATIONS.

Zoologischer Anzeiger. xx. Band, Nos. 537-538 (Aug., 1897).
From the Editor.

Bureau of Agriculture, Perth, W.A.—Journal. Nos. 14-16 and 18 (June-Aug., 1897). *From the Secretary.*

Department of Agriculture, Brisbane—Queensland Agricultural Journal. Vol. i. Parts 2-3 (Aug.-Sept., 1897). *From the Secretary for Agriculture.*

Geelong Naturalist. Vol. vi. No. 1 (Aug., 1897). *From the Society.*

Johns Hopkins University, Baltimore—Hospital Bulletin. Vol. viii. No. 76 (July, 1897). *From the University.*

U.S. Department of Agriculture, Washington: Division of Entomology—Technical Series. No. 6 (1897); General Index to Vols. i-vii. of "Insect Life." *From the Secretary of Agriculture.*

American Museum, N.Y.—Bulletin. Vol. ix. Articles xv-xvii. (pp. 213-224). *From the Museum.*

Geological Commission of the Cape of Good Hope—Bibliography of South African Geology (1897). *From the Commission.*

Société Royale Linnéenne de Bruxelles—Bulletin. *xxii^{me}*
Année. No. 8 (July, 1897). *From the Society.*

Royal Irish Academy—Proceedings. Third Series. Vol. iv.
Nos. 2-3 (April-July, 1897). *From the Academy.*

Asiatic Society of Bengal—Journal. Vol. lxxv. (1896). Part
iii. Special No.: Vol. lxxvi. (1897) Part i. No. 1; Part ii. No.
i. Proceedings, 1897. Nos. 1-4 (Jan.-April). *From the Society.*

Société d'Horticulture du Doubs, Besançon—Bulletin. Série
illustrée. No. 19 (July, 1897). *From the Society.*

Geological Survey of Canada—Annual Report. New Series.
Vol. viii., 1895 [1897] and Packet containing four Maps. *From*
the Director.

Perak Government Gazette. Vol. x. Nos. 19-20 (July-Aug.,
1897). *From the Government Secretary.*

College of Science, Imperial University of Japan—Journal.
Vol. x. Part 2 (1897). *From the Director.*

Pharmaceutical Journal of Australasia, Sydney. Vol. x. No.
8 (Aug., 1897). *From the Editor.*

Public Library, Melbourne—Report of the Trustees for 1896.
From the Trustees.

Field Naturalists' Club of Victoria—Victorian Naturalist.
Vol. xiv. No. 5 (Sept., 1897). *From the Club.*

The Manchester Museum, Owens College—Report for the Year
1896-7: Notes from the Manchester Museum. Nos. 1-4 (1896-
97). *From the Keeper.*

Geological Society, London—Quarterly Journal. Vol. liii.
Part 3 (No. 211; Aug., 1897). *From the Society.*

Linnean Society, London—Journal. Botany. Vol. xxxi. Nos.
218-219; Vol. xxxii. Nos. 220-227; Vol. xxxiii. No. 228 (1896-
97): Zoology. Vol. xxv. Nos. 163-165; Vol. xxvi. Nos. 166-167
(1895-96): Transactions. Botany. Second Series. Vol. v. Nos.

1-6 (1895-96); *Zoology*. Vol. vi. Nos. 1-8; Vol. vii. Nos. 1-3 (1894-97): Proceedings. November, 1895-June, 1896: List of Members, 1896-97. *From the Society*.

Zoological Society, London—Proceedings, 1897. Part ii.: List of the Fellows (May, 1897). *From the Society*.

American Naturalist. Vol. xxxi. No. 368 (Aug., 1897). *From the Editor*.

Royal Microscopical Society, London—Journal, 1897. Part 4 (Aug.). *From the Society*.

Department of Agriculture, Sydney—Agricultural Gazette. Vol. viii. Part 8 (Aug., 1897). *From the Hon. the Minister for Mines and Agriculture*.

La Nuova Notarisia: Rassegna consacrata allo Studio delle Alghe—Serie i. (1890—4 Pts. & Index), ii. (1891—3 Pts.), iii. (1892—3 Pts.), iv. (1893—3 Pts.), v. (1894—3 Pts.), vi. (1895—4 Pts.), vii. (1896—4 Pts.), viii. (1897—1 Pt.). *From the Editor, Dr. G. B. De Toni*.

Australian Museum, Sydney—Memoir iii. The Atoll of Funafuti. Part 4 (Sept., 1897) *From the Trustees*.

Australasian Journal of Pharmacy, Melbourne. Vol. xii. No. 141 (Sept., 1897). *From the Editor*.

Royal Swedish Academy, Stockholm—Handlingar. n.s. Vol. xxviii. (1895-6); Oefversigt. Bd. liii. (1896). *From the Academy*.

REVISION OF THE AUSTRALIAN CURCULIONIDÆ
 BELONGING TO THE SUBFAMILY
CRYPTORHYNCHIDÆ.

BY ARTHUR M. LEA.

PART I.

Australia possesses a multitude of weevils. In Masters' Catalogue of Australian Coleoptera over 1200 species are enumerated; and since the date of the Catalogue about 300 species have been added, principally by the Rev. T. Blackburn. That these numbers are far from completing the list may be readily judged by anyone possessing a fair collection. I believe that the number at present known will be more than doubled. It is much the same in other families in which the majority of species are of small size or obscure colour. The Catalogue records one species of *Phalacridæ*, thirty-four are noted in the Supplement, and I myself possess at least sixty species. Only two species of *Corylophidæ* are noted in the Catalogue, and there must be at least one hundred. Of the *Curculionidæ*, five species of *Apion* have been described, and I possess twenty-three; of *Auletes* there are six, and I have thirteen; of *Magdalis* only one species is recorded, and I have over twenty. In the Macleay Museum, containing undoubtedly the best collection of Australian insects, there must be on a low estimate at least 15,000 species of Australian Coleoptera. It is only a few years since one of the largest and perhaps the handsomest beetle in Australia (*Phalacrognathus Muelleri*) was described. Of the *Cryptorhynchidæ* scarcely two hundred species have been described (mostly by Mr. Pascoe), and I possess or have under examination considerably over three hundred. It is

with this material (with frequent additions) that I propose to revise the Australian species of the subfamily. The subfamily is in a very unsatisfactory state, there having been, in common with many other subfamilies, no attempt at systematic classification; many of the descriptions are very brief, rendering it impossible to even guess to which genus the species belongs. Moreover the habit that many of the older European entomologists had of jumping about from Order to Order and describing insects from all over the world, as well as comparing species from different islands and continents together, renders it difficult for local entomologists to do good work. If the description of a species is such that a number of species belonging to widely separated genera would fit that description I shall ignore it.

I cannot find that the subfamily has ever been treated as a whole, except by Schönherr and Lacordaire, and the divisions and limitations of the subfamily proposed by those entomologists I am not prepared to accept; doubtless had they seen large and representative collections from Australia (which was certainly not the case), both would have considerably modified their views. Schönherr attaches too little importance to the under surface, and Lacordaire too much to the metasternum and antennæ. I have been unable to find any papers by Mr. Pascoe treating of the Australian species as a whole, though here and there he has notes upon particular groups. As I wish to formulate as natural an arrangement as possible, I shall defer stating what I consider to be the main divisions with their principal features, until the end of these papers, when the whole subfamily will be reviewed.

Mr. Pascoe, in speaking of *Agrischæta*, says:—"In a family so difficult to classify as the *Curculionidæ* I think it would be better to adhere more strictly to characters, even if it should, in some cases, lead us away from an apparently more natural arrangement." Under *Europsis* he says:—"But in a large genus like *Acalles* it is very undesirable to admit any species having a structural peculiarity at variance with its normal forms." He himself, however, frequently departs from this rule; and if strictly followed it would separate forms of the affinity of which there

can be no possible doubt. It is only reasonable to expect that in a large genus there should occur species having some structural variance with the majority of species contained in that genus. Genera (and even subfamilies in the *Curculionidæ*) are too often separated (and sometimes very widely) on account of minute structural differences, the homogeneity of the whole being entirely overlooked. The *Cryptorhynchidæ* appear to form a great network of genera, in which it is possible to trace the connection between any given two; here and there, however, a genus, such as *Protopalus*, stands out prominently, whose relationships are not very apparent.

I have regarded it as necessary in every instance (where I have been at liberty to do so) to decapitate at least one specimen; by this many advantages are secured. The antennæ may be fixed in any position; the relative lengths of the funicular joints, and the point of insertion of the scape, can be readily and accurately designated. It can be seen at once whether the scape passes the apex of the rostrum or not, also its relative length as compared with the funicle. On the prothorax the shape of the ocular lobe is easily seen, as is also its ciliation.

I propose to use a few terms in a strictly limited sense, as follows:—

Muzzle.—That part of the rostrum anterior to the antennæ; only used when the antennæ are inserted close to the apex.

Ocular fovea.—A fovea nearly always present, situated between the eyes; sometimes it is very indistinct and is often obscured by scales. It appears to be analogous to the clypeal suture of other families.

Ciliation.—The fringe of the ocular lobes. It is very rarely absent though frequently obscure, and can occasionally be usefully employed.

Constriction (of the prothorax).—This word appears to be loosely used by various authors. I use it to denote an appearance (common to many species) as if the sides of the prothorax close

to the apex had been narrowly pressed in whilst soft in *Mormosintes rubus* it is greatly developed. In several of the allies of *Chaetectetorus* it is laterally continued on the disc.

Mesosternal receptacle.—That part of the mesosternum between the coxæ in which the rostrum rests. It appears to be the most trustworthy character in the group, though occasionally slightly variable sexually. In the majority of species it is cavernous; in a number it is open; in several it appears as a semicircular row of granules. When the rostrum does not rest in it but is continued beyond its position (*Melanterius*, &c.) I call it the *mesosternal plate*.

Intermediates.—The 3rd and 4th abdominal segments.

My measurements are taken with the rostrum resting in the canal; if there are apical or lateral tubercles or mucros these have been included. Mr. Pascoe appears to have measured his specimens with the rostrum extended, as in a great many instances the lengths of my specimens are less than those given by him, but if the head and rostrum were included they would agree. Mr. Waterhouse evidently measured his specimens in the same way.

The granulation of the eyes can frequently be usefully employed but cannot be entirely depended upon. It will be noticed that when the eyes are large they are usually finely faceted and flattened, and when small, coarsely faceted and more convex.

The curvature of the rostrum is not always to be depended upon generically, being frequently subject to specific and sexual variation.

I do not propose to make any use of the scrobes in defining the genera. In all the species I have examined, both Australian and foreign, these terminate either at or very close to the lower edge of the eyes. The scape always (with a few remarkable exceptions, and then only in the male sex when it passes) reaches the eye, so that this character, so useful in other groups, cannot be usefully employed in this. A very useful character, however, is whether the scape passes the apex of rostrum or not; but this is subject to considerable specific variation and is *usually* sexually variable.

The prothorax in the majority of species overhangs the head, and this feature can be usefully employed.

The presence or absence of a scutellum is not always to be relied upon, though usually constant in a genus. A number of apterous species possess it, suggesting that their ancestors once possessed wings and large scutella, of which only the rudiments are now left. On the other hand a few winged species have none at all, the scutellum being replaced by a prothoracic lobe as in the Cetonid genus *Lomaptera*.

The elytra are closely joined together whether the species be alate or apterous; the connection seems to be of the nature of a double "tongue and groove."

The abdominal segments are extremely useful in defining a genus. The basal segment is nearly always larger than any of the others; the 2nd, however, frequently approaches it in size. But it is the intermediates that are most characteristic; these are always of equal size (except for the obliquity of their sides) and similarly clothed and punctate; often depressed and level with the apical segment, sometimes deeply sunk, seldom equally convex with the other segments, and in extremely few genera varying specifically. The soldering of the segments together, and the distinctness or otherwise of the sutures can also be usefully employed.

On removing the abdomen a peculiar feature is to be noticed on each side of the elytra; this is a kind of receptacle to receive a lateral lobe of the abdomen. In a number of genera it is more distinct than in others, but in all that I have examined it is easily traceable. It is usually of a lanceolate shape, and appears to be a sudden enlargement of the hidden epipleuræ (?). It is alike in both sexes. Though present in all the *Curculionidæ*, it appears to attain its greatest development in the *Cryptorhynchides*, and perhaps next in the *Erirhinides*; in some subfamilies (*Leptopsides*, *Amycterides*, &c.) it appears as a feeble elongate impression, extending almost the entire length of the elytra.

Good characters are offered by the legs; nevertheless they are not to be entirely relied upon. In a number of genera some

of the species have dentate and others edentate femora; with several species it is only the male that has dentate femora, and in at least one species (*Pezichus binotatus*) it is certainly the reverse. The femora may or may not pass the elytra in congeners, but this character is usually constant. Their grooving I think is to be depended upon, though varying in the different legs. The tibiae nearly always terminate in a hook, and there is frequently a small tuft of setæ or elongate scales close to it. The tarsi in certain groups (especially in the allies of *Poropterus*) appear to be variable, and I consider it necessary in certain cases to join species having linear tarsi with those in which the 3rd joint is more or less widely bilobed. The claw joint is usually constant, and I regard it as improbable that two species, of which one has this joint squamose and the other glabrous, can belong to the same genus. Attention was first directed to this character by Mr. Pascoe, and slight as it may appear, it is undoubtedly very useful.

As an aid towards identification, tabulations of the species will be appended to the generic diagnoses, and these, whenever possible, will be founded on easily recognisable features. In the case of *Poropterus* short descriptions of the groups and species are given, as many of the species (though sufficiently distinct), do not possess strongly marked or reliable characters for tabulation.

The material I have under examination is rich in species from New South Wales, Southern Queensland, and South-Western Australia; comparatively rich in Northern Queensland, Victorian and Tasmanian forms, and poor in species from South and North-Western Australia. From the Northern Territory of South Australia I have none at present.

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co-types) of a number of the species described by Mr. Pascoe, besides a large number of new forms.

Genus POROPTERUS, Schönherr.

Schönh., Gen. et Spec. Curc. Vol. viii. Pt. 1, p. 431, Genus No. 547; Waterhouse, Trans. Ent. Soc. Lond. ii. (2), 1853, p. 195; Pascoe, Journ. Linn. Soc. xi. 1870, p. 189; Lacord., Gen. des Col. vii. p. 91.

Head flat, never more than slightly convex. *Ocular fovea* small or almost obsolete, often entirely concealed by scales. *Eyes* moderately or somewhat coarsely granulate, rounded, widely separated, an obsolete line beneath them. *Rostrum* never more than moderately curved, occasionally almost straight, broad, flattened, more or less scaly, muzzle widening to apex; usually broader, shorter and more curved in ♂. *Antennæ* slender. *Scape* sometimes inserted in the exact middle of rostrum, but usually much closer to apex, usually passing muzzle for a considerable distance, but sexually variable, often without scales or setæ. *Funicle* with two basal joints more or less elongate. *Club* either short, subcircular, or moderately elongate, adnate to funicle or not, joints indistinct or invisible. *Prothorax* either as wide as long, or a little longer than wide; apex usually much narrower than base, sometimes rounded or truncate, often bluntly bifurcate; sides more or less rounded and precipitous; base either very feebly bisinuate or truncate, occasionally with a small scutellar lobe; ocular lobes somewhat prominent; ciliation minute, rarely entirely absent, seldom visible unless head be removed; usually with a narrower, more or less shining, abbreviated carina along the median line, a depression on each side of it, occasionally with a depression in place of the carina, sometimes without either; often with a single or two transversè series of four tubercles which are occasionally united in the middle and subjoined at the sides, seldom entirely absent; frequently with small granules; rarely visibly punctate. *Scutellum* small or absent. *Elytra* from once and one-half to more than twice the length of prothorax, widest about the middle, but occasionally nearer the base, sometimes

subparallel; convex, but occasionally flattened; shoulders usually strongly rounded off, sometimes with a large tubercle projecting more or less over prothorax; base applied more or less closely to prothorax; feebly bi-, tri-, quadri-, multi-sinuate or truncate; apex more or less produced, rounded, mucronate, or tuberculate; usually supplied with large tubercles arranged in rows; sometimes granulate, fasciculate, never smooth; punctures obliterated, distinct, or increasing to foveæ, more or less filled with scales, regular or irregular. *Pectoral canal* terminating between two pairs of anterior legs. *Mesosternal receptacle* cavernous, moderately raised, semicircular in front. *Meso-* and *metasternum* narrow, apex of the latter truncate between anterior coxæ, base emarginate and often with a small shallow depression. Basal segment of *abdomen* large, usually about twice the length of 2nd; intercoxal process broad, feebly produced in the middle; apex feebly arcuate, behind the coxæ often very feebly raised; suture between 1st and 2nd distinct; 2nd feebly arcuate or parallel-sided; intermediates narrow, often slightly below the general level, their combined length equal to or shorter than apical. *Legs* moderately long, anterior and posterior slightly different in length and sexually variable. *Femora* linear, edentate; seldom reaching or passing apex of abdomen and very seldom passing elytra, and then for a very short distance in the males, usually terminating at about the middle of the posterior declivity. *Tibiæ* short, straight, or very feebly curved, somewhat compressed. *Tarsi* usually about two-thirds the length of tibiæ, 3rd joint narrowly, sometimes broadly bilobed, in *rubus* entire; more or less densely padded beneath, the padding when viewed from some directions appears silvery at apices and sides; claw-joint elongate, about equal to the basal, with minute scales and dense hairs; claws free, widely or moderately separated. *Body* more or less densely covered with scales, never smooth and shining; usually almost as deep as wide, but sometimes much wider than deep; either elliptic, cylindric or subcylindric; apterous.

This genus was proposed by Schönherr to receive several Tasmanian species, and as was often the case where but few species

of a genus were known to him (and as must often be the case with others) those species are not truly representative of the whole genus. *Poropterus* I regard as typical of the whole subfamily, having few characters that may be relied on generically, the species variable in size and sexually variable, and having affinities in the most unexpected directions. A number of species have been referred to it which should be excluded. I do not think that any species having the two basal abdominal segments soldered together should be admitted, and on this account I exclude *porrigineus*, Pasc.,* which seems to be much closer to *Paleticus*; neither should any species having the mesosternal receptacle straight at its apex; *satyrus*, Pasc., *foveipennis*, Pasc., *musculus*, Pasc., *tetricus*, Pasc., should perhaps also be excluded; they are unknown to me except by description. I exclude *lemur*, Pasc., for which a new genus is required; *tumulosus*, Pasc., is not properly referable to *Poropterus*; it is closer to *Petosiris*, but a new genus is required to receive it and several other species I possess. Probably species standing in other genera (especially in *Acalles* and *Cryptorrhynchus*) are referable to it. I refer *Mormosintes rubus* to the genus, the linear tarsi on which Pascoe founded *Mormosintes* not appearing to warrant generic separation. Pascoe states that "*Curculio luridus*, Fabr., placed in *Acalles* in the Munich Catalogue, is a *Poropterus*." In Masters' Catalogue, *Cryptorrhynchus fuliginosus*, Boisd., is placed as a synonym of that species, as also *Acalles immansuetus*, Bohem. If this synonymy is correct, the species is certainly not a *Poropterus*, as in describing *immansuetus* Boheman says, "*femoribus subtus dente parvo, obtuso, armatis*"; a character which would at once exclude it.

Members of the genus are to be found along the entire eastern coastal districts of Australia; they are scarce in South Australia

* In this species the two basal abdominal segments are not free, though on a first glance they appear to be so; on removing the scales, however, their true nature is to be seen.

and moderately numerous in Tasmania (where a species* has been recorded as destructive to fruit trees, by nibbling the bark, and young buds); the dense tropical scrubs of Queensland and northern New South Wales abound in them. Most of the species may be taken in abundance at night time crawling over logs and stumps; during the day they usually remain concealed in holes they or other insects have drilled in timber. West of and on the Great Dividing Range several species are very abundant under logs, stones, &c. The colour of all the species may be described as opaque-black, antennæ, claws and tibial hooks piceous-red or reddish-piceous.

The genus cannot be satisfactorily divided into groups dependent only on the relative lengths of the two basal joints of the funicle; it may, however, be divided into several natural ones; and this I attempt to do with the species I am acquainted with.

i—Scutellum present.

Group A—Type, *P. antiquus*.

Narrow, subparallel, convex, granulate and feebly or not at all tuberculate. Eyes moderately granulate. Rostrum curved. Antennæ elongate; scape inserted close to apex, considerably passing muzzle; basal joint of funicle equal to or a little longer than 2nd; club free. Prothorax not much narrower at apex than at base, carina feeble. Scutellum present. Elytra with shoulders feebly rounded. Intermediate segments of abdomen rather wide, flat, not depressed below level of apical. Femora not reaching middle of posterior declivity.

This group, consisting of three closely allied species is, I believe, confined to Tasmania.

Elytra with posterior declivity almost perpendicular;
 near its summit with a feeble obtuse tubercle on 3rd
 interstice..... *zopherus*, n.sp.
 Posterior declivity rounded, without tubercle. Inter-
 coxal process narrower than in the preceding..... *abstersus*, Bohem.

P. antiquus, Bohem.

Prothorax with a transverse row of four small tubercles.

Second and 4th interstices of elytra with small tubercles; posterior declivity moderately elongate, apex flattened..... *antiquus*, Bohem.

POROPTERUS ZOPHERUS, n.sp.

Moderately clothed with short roundish brown scales, more elongate towards sides, densest towards apex of elytra, sparse on under surface; femora and tibiæ with dense adpressed scales; head and rostrum with sooty-black, the former in addition with brown scales. Ciliation minute, rather sparse, silvery-yellow.

Convex, cylindric, feebly tuberculate. *Head* feebly punctate; rostrum coarsely punctate at base, more finely towards apex; eyes moderately granulate, ocular fovea almost concealed, rostrum curved, parallel, scape inserted about one-third from apex, its thickened portion passing muzzle, 1st joint of funicle about as long as 2nd, 2nd not as long as three following combined; club free. *Prothorax* scarcely longer than wide, flattened; apex feebly produced, rounded, not much narrower than base; ocular lobes rounded; constriction continuous across summit, deepest at sides; sides feebly decreasing to base; median carina short, feeble, flattened; disc with small granules, transverse row of tubercles just traceable. *Scutellum* small, triangularly rounded. *Elytra* wider than prothorax at base, and more than twice as long; sides subparallel to near apex; base bisinuate, with distinct and regular rows of rather large punctures; posterior declivity abrupt, with a feeble tubercle which is moderately distinct when viewed from the side almost at the summit on 3rd interstice. *Abdomen* feebly convex and punctate, basal segment not twice as long as 2nd, a feeble longitudinal depression in its middle; intermediates flat, on a level with apical and longer than 2nd and apical. *Posterior femora* just passing intermediate segments; tibiæ straight, the anterior very feebly bisinuate on their upper surfaces; tarsi rather short, 3rd joint rather widely bilobed, 4th not distinctly longer than 1st. Length 12, rostrum $2\frac{1}{2}$; width $4\frac{3}{4}$ mm.

Hab.—Tasmania (Mr. A. Simson, No. 3369; Rev. T. Blackburn, No. 6191).

In this species the legs are sexually variable in thickness.

POROPTERUS ABSTERSUS, Bohem.; Mast. Cat. Sp. No. 5419.

Upper surface sparsely clothed with dark brown short scales, interspersed with a few more elongate towards sides; under surface with paler scales, which have a feeble lustre at base of under surface of femora; legs with adpressed elongate scales; head densely, rostrum less densely squamose. Ciliation very short, silvery-yellow.

Convex, cylindric, feebly tuberculate. *Head* with feeble ocular fovea; eyes moderately granulate; rostrum curved, distinctly punctate, muzzle widening to apex; scape inserted about one-third from apex, passing muzzle for almost half its length; 1st joint of funicle a little longer than 2nd, 2nd as long as two following combined; club free. *Prothorax* as in preceding except that apical constriction is narrower, sides more rounded, median carina less and the granules a little more distinct. *Elytra* as in preceding except that the sides are more rounded, punctures larger, less in number and more distinct, posterior declivity less abrupt and almost without trace of tubercles at summit. *Abdomen* flattened, distinctly punctate, intercoxal process narrower than in the preceding, its sides near coxæ distinctly elevated; intermediate segments larger. *Femora* just reaching apical segment. Length 9, rostrum 2; width $3\frac{1}{4}$ mm.

Hab.—Tasmania (Rev. T. Blackburn, Nos. 6190 and 6192; Mr. G. Masters). Described by Boheman from Australia.

POROPTERUS ANTIQUUS, Bohem.; Mast. Cat. Sp. No. 5420.

Moderately densely clothed with brown and sooty-brown short or elongate scales, densest towards apex of elytra; under surface with paler scales; legs with still paler, very dense, adpressed, elongate scales; head and base of rostrum densely squamose. Ciliation sparse, short, brownish.

Convex, cylindric, feebly tuberculate. *Head* and rostrum densely punctate (but the punctures usually concealed); ocular fovea almost obsolete; rostrum curved, subparallel, the muzzle feebly widening to apex; scape inserted at less than one-third

from apex, nearly half of its length passing muzzle (a little less in ♀); 1st joint of funicle a little longer than 2nd, 2nd as long as two following combined; club subadnate to funicle. *Prothorax* very little longer than wide; apex feebly produced; rounded, not much narrower than base; ocular lobes almost obsolete; constriction rather feeble, continuous across summit, median carina short but moderately distinct, transverse row of tubercles feeble but more distinct than in either of the preceding, with numerous small granules. *Scutellum* very small. *Elytra* feebly bisinuate at base, where it is as wide as prothorax, and more than twice as long; sides feebly widening to about the middle, towards apex curved inward, apex itself almost truncate, thickened and feebly flattened; with distinct but somewhat irregular rows of moderately large punctures; 2nd and 4th interstices very feebly tuberculate, the tubercles moderately distinct when viewed sideways, one on each side of summit of declivity (which is more elongate than in either of the preceding) is a little more distinct. *Abdomen* very feebly convex, basal segment not twice as long as 2nd, from the 2nd feebly encroached upon by sides of elytra in ♂; intermediates rather large, longer than 2nd or apical, apical feebly transversely impressed in ♂. *Femora* in both sexes slightly passing intermediate segments; tibiae very feebly curved; tarsi short, 3rd joint rather widely bilobed, 4th a little longer than 1st. Length 10, rostrum $2\frac{1}{4}$; width 4 mm.

Hab.—Tasmania (Mr. A. Simson, No. 3203; Rev. T. Blackburn, No. 6191; Mr. G. Masters).

I have a specimen in which there are two small triangular patches of whitish scales on each side of the suture at base.

Group B.—Type *P. succisus*.

Narrow, subelliptic, convex, tuberculate and granulate. Rostrum curved, sparsely squamose. Antennæ elongate; scape inserted at about one-third or less from apex, moderately or considerably passing muzzle; 1st joint of funicle equal to or a little longer than 2nd; club free. Prothorax carinate, apex scarcely narrower than base. Scutellum very small. Elytra widest about

middle, shoulders feebly rounded, posterior declivity at its summit on 3rd interstice with conical tubercle. Femora reaching or passing middle of declivity; tarsi strongly bilobed.

This division is intermediate between *antiquus* and *Westwoodi*.

Prothoracic carina and tubercles feeble. Tubercles of declivity more than thrice as large as any of the others, feebly compressed; apex with two distinct tubercles..... *succisus*, Erichs.

Prothorax with median carina fully half its length, transverse tubercles distinct. Elytra with tubercles of declivity large, thick, scarcely twice as large as those on the 5th interstices a little behind them; apex obsoletely tuberculate. Femora almost reaching apex of elytra..... *corvus*, n.sp.

POROPTERUS SUCCISUS, Erichs.; Mast. Cat. Sp. No. 5551.

(*Cryptorrhynchus*, Er.): *P. succosus*, Bohem.; No. 5441.

Densely clothed with minute muddy-brown scales, more distinct on prothorax and sides of elytra, tubercles more or less naked, under surface with elongate paler scales, legs with dense elongate scales; head feebly clothed, rostrum still more feebly, the scales darker and sparser. Ciliation very minute, bright silvery.

Convex, subcylindric, tubercles mostly small. *Head* and rostrum densely punctate; ocular fovea small, deep, usually concealed; eyes rather coarsely granulate; rostrum curved, subparallel, muzzle feebly widened to apex; antennæ elongate, scape inserted a little less than one-third from apex in ♂, about half in ♀, a little less than half its length passing muzzle; first joint of funicle distinctly longer than 2nd, 2nd not as long as three following combined; club free, distinctly four-jointed. *Prothorax* a trifle longer than wide; apex feebly produced, rounded, more than half the width of base; constriction feeble, and very feebly continued across summit; ocular lobes rounded; sides rounded; base truncate; median carina short, feeble, but moderately distinct; a transverse row of four rather feeble tubercles, behind them densely, in front more sparsely granulate. *Scutellum* very small. *Elytra* more than twice the length of prothorax and at its base as

wide; sides widening to about the middle, and then a little more suddenly narrowed, with numerous granules; 2nd and 4th interstices with feeble tubercles, 2nd at summit of declivity (which is almost vertical) with a large conical granulate tubercle, behind it on 4th a much smaller one, apex with a feeble tubercle on each side; sides and declivity distinctly punctate. *Abdomen* rather broad, narrowest in ♂, basal segments fully twice as long as 2nd, intercoxal process very flat; 2nd small, almost as long as intermediates, which are shorter than apical; apical densely minutely punctate at apex, widest in ♀. *Femora* almost or just reaching apex of abdomen, tibiae very feebly curved, tarsi rather thick, 3rd joint distinctly bilobed, 4th scarcely longer than 1st. Length $10\frac{1}{2}$, rostrum $2\frac{1}{2}$; width $4\frac{3}{4}$ mm.

Hab.—Tasmania (Messrs. G. Masters, A. Simson, C. French).

POROPTERUS CORVUS, n.sp.

♀ (?). Upper surface very sparsely clothed with small dark brown or blackish scales; under surface—except on some of the abdominal segments,—with paler and somewhat denser scales; femora and tibiae with dark brown moderately elongate scales; head and rostrum feebly squamose. Ciliation extremely minute, silvery.

Convex, subcylindric, strongly tuberculate. *Head* feebly, rostrum more distinctly punctate; ocular fovea small; rostrum subparallel, feebly curved; antennae short, scape inserted about two-fifths from apex, just reaching apex of muzzle, 1st joint of funicle a little longer than 2nd, 2nd a little longer than two following combined, 7th fully as broad as club; club free. *Prothorax* as long as wide; apex feebly produced, rounded, about half the width of base; ocular lobes moderately prominent; constriction feeble on sides, more distinct but interrupted three times on summit; sides rounded; base truncate; median carina distinct, rather long; a transverse row of four distinct and rather large tubercles, the median largest, behind them with numerous rather large granules smaller at the side and sparser in front; each side of apex with a feeble obtuse ridge. *Scutellum* almost invisible. *Elytra* more

than twice the length of prothorax, and at its base (which is truncate) almost as wide; sides widening to about the middle; with rows of moderately large and very distinct tubercles, five on second, the first some distance from base, 2nd very small and close to first, 3rd as large as 2nd, 4th twice as large as 1st, 5th a little below summit of declivity (which behind them is precipitous) and largest of all, conical; 4th interstice with a moderately large tubercle about as far behind base as it is in front of the 1st of 2nd interstice, behind it several small tubercles, near largest of 2nd a distinct conical tubercle about half its size; sides with a few small ones; apex with three very small tubercles; the central one sutural, causing apex to appear feebly bisinuate; numerous small granules scattered about, rather regularly arranged towards suture; sides with two distinct rows of regular punctures, less regular and smaller elsewhere. Basal segment of *abdomen* twice as long as 2nd, their sutures distinct only at sides; intermediates feebly depressed, not as long as apical, their sutures deep and wide. *Femora* not quite reaching apex of abdomen; *tibiæ* very feebly but noticeably curved inwardly; *tarsi* thick; 3rd joint distinctly bilobed, 4th scarcely longer than 1st. Length $11\frac{1}{2}$, rostrum $2\frac{1}{2}$; width $4\frac{1}{2}$ mm.

Hab.—New England, N.S.W. (Mr. D. A. Porter).

Group C.—Type *P. Westwoodi*.

Narrow, elongate, subelliptic, convex, tuberculate and granulate. Eyes finely granulate. Rostrum feebly curved. Antennæ elongate; scape inserted at about one-third from apex, not reaching, reaching or considerably passing apex of muzzle; 2nd joint of funicle equal to or a little longer than 1st; club free. Prothorax carinate, apex about half the width of base, with a distinct tubercle on each side but scarcely bifurcate, median tubercles granulate, lateral also granulate but more irregularly. Scutellum present. Each elytron (besides others) with a large conical tubercle on the 3rd interstice in the middle of posterior declivity; apical tubercles scarcely touching; shoulders narrow. Intermediate segments of abdomen on a level with apical. Legs long, third tarsal joint moderately bilobed.

Differs from the *Chevrolati*-group in having a scutellum, apex of prothorax not bifurcate, and in the large posterior tubercle.

Prothorax with apical tubercles compressed and rather elongate, apical tubercles of elytra small, four in number, the two inner very small. Femora not reaching base of tubercles of declivity, the apices of which (in both sexes) pass apical tubercles..... *Westwoodi*, Waterh.

Narrower than the preceding. Apical tubercles of prothorax small, fasciculate, not compressed. Femora almost reaching apices of tubercles of declivity, which do not reach apices of apical tubercles, these latter distinct..... *Waterhousei*, Pasc.

Almost parallel-sided. Prothorax with large scales extending from median tubercles to apex, where they are fasciculate. Most of the elytral tubercles small, the two on the declivity large, not visibly granulate (but like the two preceding densely squamose) but feebly projecting outwards, femora scarcely reaching their bases; apical tubercles prominent, but not so sharp as in the preceding..... *angustatus*, n.sp.

POROPTERUS WESTWOODI, Waterh.; Mast. Cat. Sp. No. 5447.

P. hariolus, Pasc.; No. 5428.

♂. Upper surface moderately densely clothed with rather small elongate scales; the majority are of a warm brown colour, but on the apex and sides of prothorax and sides of elytra they are always white (subject to the usual alteration with age, etc.); scutellum with minute pale scales; intermixed on head and rostrum. Under surface and legs with warm brown moderately elongate scales, longest and densest on tibiæ, on the abdomen—to the naked eye—in feeble rows; rostrum squamose its entire length; femora (to the naked eye) appearing ringed towards apex. Ciliation moderately elongate, silvery-yellow, slightly visible with head in position.

Convex, subcylindric, strongly tuberculate. *Head* feebly, rostrum more densely punctate; the punctures covered with scales, ocular fovea minute; eyes finely granulate, small, more distinctly convex than is usual in the genus; rostrum feebly curved, muzzle feebly widening to apex; antennæ rather elongate; scape inserted

about two-fifths from apex, slightly passing muzzle; basal joint of funicle longer than 2nd; club free, indistinctly four-jointed. *Prothorax* a little longer than wide, apex rounded, about three-fifths the width of base; ocular lobes distinct; constriction shallow, continued as a depression across summit; median carina feeble, a feeble depression on each side of it; a transverse row of four large granulate tubercles, the median slightly to the rear of lateral, as high as wide but not as long, lateral tubercles flattened and irregular; apex with a longitudinal tubercle or outwardly projecting ridge on each side ending at constriction, numerous small tubercles showing through scales. *Scutellum* distinct, semicircular. *Elytra* more than twice the length of prothorax, widest a little before the middle, with numerous granules scattered about and on tubercles, feebly punctate, the punctures more distinct at sides; shoulders feebly projecting on to prothorax; 2nd interstice with three large conical tubercles, posterior largest and at summit of declivity (which is moderately elongate), intermediate smallest; 3rd interstice with the largest tubercle of all, conical, rather sharp, outwardly projecting and situate at side of middle of declivity; a row of three comparatively small tubercles obliquely placed, 1st and 2nd on 5th interstice, 3rd and largest on 3rd interstice and a little behind the exact middle; apex with a small conical tubercle on each side, and a much smaller and blunter one inwardly. Basal segment of *abdomen* not twice as long as 2nd, the suture with it curved, subobcordate, intercoxal process flat; 2nd feebly convex in the middle; intermediates rather large, longer than second or apical, sutures deep but narrow, apical very feebly transversely impressed, subtriangular. *Legs* long, posterior femora reaching middle of apical segment; tibiæ straight, slightly flattened; tarsi narrow, 3rd joint distinctly bilobed, 4th (if anything) a little shorter than 1st. Length 16, rostrum 4; width 7 mm.

♀. Differs in being larger and broader, head larger in proportion; rostrum longer, straighter and more parallel, scape not reaching apex of muzzle, tubercles more obtuse, and prothoracic carina longer. Length 18, rostrum $5\frac{2}{3}$; width $8\frac{1}{2}$ mm.

Hab.—Richmond River, N.S.W. (Lea); Queensland (Macleay and Sydney Museums). Described by Waterhouse from Australia.

P. hariolus is a synonym of this species. Of it Mr. Pascoe says:—"Differs from *P. Westwoodi*, Waterh., *inter alia*, in having the apex of each elytron bituberculate." The small inner tubercles might very well have been regarded by Mr. Waterhouse as nothing more than granules and consequently not mentioned, especially as they are often almost completely concealed by scales.

POROPTERUS WATERHOUSEI, Pasc.; Mast. Cat. Sp. No. 5446.

Moderately densely clothed with small slightly elongate brown—intermixed with griseous—scales, on the tubercles they are dark brown (except humeral, where they are paler and very dense); under surface with brown or dark brown, sparse, feebly elongate scales; femora and tibiae densely clothed with elongate scales; on the head and rostrum the scales are dingy, but paler towards base and apex. Ciliation moderately elongate, rather straggling, silvery-brown, scarcely visible with head in position.

Convex, elongate-elliptic, strongly tuberculate. *Head* and rostrum sparsely—the latter on muzzle—more densely punctate; ocular fovea small, deep; eyes finely granulate; rostrum moderately long, feebly curved, muzzle widening to apex; antennæ not very elongate; scape inserted about two-fifths from apex, passing muzzle; 1st joint of funicle distinctly shorter than 2nd, 2nd very slightly longer than three following combined; club subadnate to funicle. *Prothorax* longer than wide, apex produced, rounded, about half the width of base, appearing feebly bifurcate from two small fasciculate tubercles; ocular lobes rounded, but rather prominent; constriction on account of scales appearing rather shallow, but in reality deep, visible from above; median carina narrow, continuous almost from base to apex, but very indistinct behind the middle, the disc on each side of it with a moderately large rounded and rather flat granulate tubercle; lateral tubercles irregular, obtuse, flattened, in front of median, the apex in front of them—as in the preceding and to a certain extent in the following species—appearing subquadrate; basal half with numer-

ous rather large and shining granules, declivity with smaller granules. *Scutellum* small, distinct, semicircular. *Elytra* more than twice the length of prothorax and very little wider, widest about the middle, shoulders feebly projecting on to prothorax, and rendered very distinct on account of the colour of the scales by which they are clothed; base depressed; large granules scattered about with smaller ones, or tubercles, lateral punctures large and distinct: all the tubercles (except extreme apical) smaller than in the preceding; 2nd interstice with three large equidistant ones, basal longest, 2nd smallest and most irregular, 3rd largest and at summit of declivity (which is a very little more elongate than in the preceding), about its middle at the sides on 3rd interstice a large conical feebly outwardly projecting tubercle, sides with less distinct tubercles, all anterior to 3rd discal, two on 4th interstice of which the posterior is largest, two close together on 6th of which the anterior is largest (when viewed from the side with the naked eye there appear to be others, owing to the approximation of some of the granules); apex with a rather large flattened-conical tubercle at each side, subparallel on their outer edges. *Abdominal segments* (except basal) feebly convex, each feebly depressed at base and apex, sutures deep, basal not twice as long as 2nd, intercoxal process with a subcircular depression at its apex, its middle marking the base of a very distinct depression on metasternum; 2nd segment (to the naked eye) appearing bulged out at sides, intermediates longer than 2nd or apical, apical feebly curved inwardly at apex. *Legs* long; femora very slightly passing abdomen but not elytra; intermediate tibiæ straight, the others almost imperceptibly curved; 3rd tarsal joint widely bilobed, 4th no longer than 1st. Length 15, rostrum $3\frac{1}{2}$; width $5\frac{1}{2}$ mm.

Hab.—Richmond River, N.S.W. (Lea); two specimens, both apparently males. Originally described from Queensland.

POROPTERUS ANGUSTATUS, n.sp.

Upper surface densely clothed with elongate pale yellow scales, palest and most elongate at apex of prothorax, tinged with brown

along the middle (except apices) and sides of prothorax and elytra; under surface with sparser scales, abdominal segments (to the naked eye) with three rows of paler scales, legs densely squamose, femora feebly ringed; head and rostrum densely squamose, the scales tinged with brown towards base and apex. Ciliation moderately elongate, pale silvery-yellow.

Narrow, convex, subparallel, tubercles mostly small. *Head* with a very feeble tubercle on each side of the middle and almost at extreme base, punctures (if present) entirely concealed; eyes rather large, finely granulate, between them a feeble carina showing through scales and apparently continued on to rostrum (which is almost straight and parallel-sided); antennæ rather short, scape inserted about one-third from apex, passing muzzle; 2nd joint of funicle slightly longer than but not as thick as 1st and not as long as three following combined; club thick, almost free. *Prothorax* with apex produced, subtruncate, about half the width of base, basal two-thirds subparallel, ocular lobes feeble; constriction deep, visible from above; median carina rather thick and showing only in the middle; on each side of it an obtuse rounded tubercle; lateral tubercles feeble, flattened, the anterior only feebly distinct; sides of apex feebly ridged, and from the density of the scales by which the ridges are covered appearing bifurcate; base with a few large granules or very small tubercles. *Scutellum* very small and indistinct. *Elytra* more than twice the length of prothorax and scarcely—if at all—wider, very feebly widening to about one-third from base, shoulders feebly produced; the tubercles only at sides of declivity on 3rd interstice large and conical, three on 2nd interstice small, basal equidistant from base and 2nd, 3rd as far distant from 2nd as 2nd is from base, and at summit of declivity (which is elongate); 4th interstice with very feeble tubercles, the most distinct near third discal, the interstices apparently feebly tuberculate, raised towards the sides; apex with a rather large flattened conical tubercle on each side; disc with numerous small granules; sides with large shallow punctures. *Abdomen* (except for scales and flattened intercoxal process) as in preceding. *Femora* long, posterior almost reaching apex of

abdomen; tibiæ short, flattened, moderately distinctly but very feebly curved; 3rd tarsal joint widely bilobed, 4th slightly longer than 1st. Length 12, rostrum $2\frac{1}{4}$; width $3\frac{1}{4}$ mm.

Hab.—Richmond River, N.S.W.

Owing to the density of the scales by which my specimen (apparently ♀) is covered, the granules, &c., are rendered somewhat indistinct.

ii.—Scutellum absent.

Group D—Type *P. sphacelatus*.

Robust, convex, tuberculate. Rostrum feebly bent, not densely squamose. Antennæ moderately elongate; scape feebly squamose or setose, inserted a little in front of the middle, seldom reaching, or passing apex of muzzle for but a very short distance; basal joint of funicle equal to or a little longer than 2nd; club subsolid, subadnate to funicle or free. Prothorax with two transverse rows of tubercles, carina slight or absent, with a small scutellar lobe, apex with feebly projecting tubercles giving it a bifurcate appearance. Scutellum absent. Elytra with three more or less large tubercles on 2nd interstice, declivity with a small usually white-tipped tubercle on 2nd or 3rd interstice, a shining granule on each side of scutellar region. Second abdominal segment not half the length of basal, intermediates very slightly, if at all below level of apical. Femora almost reaching, reaching, or slightly passing apex of elytra. Third tarsal joint almost simple.

Scales uniformly coloured. Subparallel. Tubercles of elytra large..... *verres*, Pasc.

Resembling but smaller and less parallel than preceding, tubercles smaller, apex of prothorax, apex and sides of elytra with paler scales; the club a little less elongate and more decidedly free..... *sphacelatus*, Pasc.

Very different in appearance from either of the preceding.

Prothorax and elytra flattened, the former with a moderately distinct carina; tubercles more in advance of the middle than in either of them. Base of elytra with a distinct laterally projecting tubercle; apex with large subtriangular tubercles, almost united at base..... *Parryi*, Waterh.

POROPTERUS VERRES, Pasc.; Mast. Cat. Sp. No. 5445.

♀. Upper surface, head and femora densely clothed with brown rounded or moderately elongate scales, densest on tubercles; scape with a few elongate scales towards apex, under surface and tibiae with elongate scales. Ciliation minute, sparse and dark, almost invisible with head in position.

Convex, subcylindric, strongly tuberculate. *Head* convex, ocular fovea small; eyes moderately granulate, produced at apex; rostrum elongate, almost straight, feebly widening from scape to base and apex, with large and dense punctures becoming obsolete near base, scape inserted a little in front of the middle, not reaching apex; basal joint of funicle distinctly longer than 2nd, 2nd not as long as three following combined; club subadnate to funicle. *Prothorax* distinctly longer than wide, apex produced, bifurcate, about half the width of base; ocular lobes slightly rounded; constriction deep, continued as a depression across summit; without carina (except as a small scutellar lobe) but a median line extending its whole length; two transverse series of 4 small and distinct tubercles. *Elytra* about once and one-half as long as prothorax and scarcely wider about its middle; 2nd interstice with a distinctly elevated granule at side of scutellar lobe, with three large equidistant tubercles, the third at summit of declivity (which is abrupt), below it a very small tubercle; 4th interstice with 3 large ones but smaller than those of 2nd, the 1st level with 1st, 2nd and 3rd a little behind 2nd and 3rd of 2nd interstice, between 1st and 2nd a very small tubercle, and below third another small one, 6th interstice with an elongate obtuse tubercle; shoulders somewhat thickened; sides with regular rows of large punctures, much smaller and less distinct on disc; apex very feebly bisinuate. *Abdominal segments* almost level, sutures very distinct, basal flat, twice as long as 2nd, intercoxal process narrow, rounded, its sides feebly raised; 2nd longest at sides; intermediates feebly convex, longer than 2nd

and as long as apical. *Legs* long; posterior femora just passing elytra; tibiæ feebly compressed and very feebly curved; tarsi narrow, 3rd joint feebly bilobed, 4th distinctly longer than 1st. Length $16\frac{1}{2}$, rostrum $4\frac{1}{2}$; width 7 mm.

♂. Differs in being smaller, scales less uniformly coloured, rostrum more curved, scape inserted closer to apex, legs a little longer and elytra less parallel.

Hab.—Tweed and Richmond Rivers, N.S.W. (Lea). Originally described from Queensland.

POROPTERUS SPHACELATUS, Pasc.; Mast. Cat. Sp. No. 5440.

Upper surface moderately densely clothed (densest on tubercles and apex of prothorax) with feebly elongate brown scales; on the apex, median line; and sides of prothorax, sides near base, and suture at declivity of elytra, they are much paler; under surface with sparse, scarcely elongate scales, tibiæ with elongate scales, scape with a few at apex; rostrum moderately clothed. Ciliation minute, silvery-yellow.

Convex, subcylindric, feebly tuberculate. *Head* convex; ocular fovea distinct; eyes rather coarsely granulate, apex produced; rostrum thick, feebly curved, coarsely punctate in ♂, in ♀ the rostrum a little longer, flatter, and with the punctures less obscured; antennæ rather thick, scape inserted about three-sevenths from apex, in neither sex reaching extreme apex, basal joint of funicle slightly longer than 2nd, 2nd the length of two following combined; club shortly elliptic, free. *Prothorax* longer than wide, apex produced, bifurcate, more than half the width of base; sides and base rounded; ocular lobes less prominent than in the preceding; constriction deep but short, continued as a depression across summit; tubercles and scutellar lobe similar to but smaller than preceding. *Elytra* less parallel and slightly broader than in preceding, tubercles similar in position but decidedly smaller, the basal of 4th interstice decidedly larger

than that of 2nd (in the preceding it is a trifle smaller); apex narrow, a small and distinct tubercle on each side; punctures as in preceding. *Abdomen* almost as in preceding, the 2nd with a transverse excavation on each side at base. *Posterior femora* in ♀ scarcely reaching, in ♂ just passing apex of elytra; tibiae straight; 3rd tarsal joint feebly bilobed. Length 11, rostrum 3; width 5 mm.

Hab.—Queensland (Mr. G. Masters); Richmond River, N.S.W. (Lea).

Similar to but decidedly distinct from the preceding species; both are common; in the present species the elytra are scarcely as deep as wide, in the preceding they appear to be deeper; the insertion and length of the scape and the posterior femora differ but little sexually in either.

POROPTERUS PARRYI, Waterh.; Mast. Cat. Sp. No. 5435.

♂. Densely clothed all over—densest on tubercles—with moderately elongate brown scales, each puncture with a larger and paler scale, tubercles of posterior declivity with whitish scales (colours obscured by age, etc.); under surface and legs with moderately elongate scales, rostrum more or less densely clothed. Ciliation moderately elongate, silvery-yellow, slightly visible with head in position.

Flat, broad, moderately tuberculate. *Head* feebly impressed between eyes, but without ocular fovea; eyes rounded, more convex than is usual in the genus, finely granulate; rostrum curved, subparallel, densely and irregularly punctate, a carina extending from between eyes almost to apex; scape inserted about three-sevenths from apex, not reaching mandibles; two basal joints of funicle equal, 2nd not as long as three following combined; club elongate, free. *Prothorax* no longer than wide; apex feebly produced and appearing feebly bifurcate, more than half the width of base; ocular lobes prominent; constriction broad and

feeble; median carina short, distinct: two transverse rows of four tubercles, the lateral very obtuse, the median distinct, the anterior of the median tubercles distinctly in advance of the anterior of the lateral (in all the other species of the genus they are behind them), base with numerous obtuse granules. *Elytra* much wider than prothorax, and not twice as long, 2nd interstice with three distinct equidistant tubercles, the largest at summit of declivity (which is at an angle of 45°), base with a small granule, 4th with two distinct tubercles intermediate between those of 2nd, at about middle of declivity a small tubercle rendered very distinct by the colour of its scales; 6th with two, one of which is humeral, large, and outwardly projecting, and feebly connected with the second, which is slightly in advance of the second tubercle of 2nd interstice, a tubercle on the 7th intermediate between those of 6th; apex with a large conical tubercle on each side, with regular rows of distinct punctures largest towards the side. *Abdomen* flat, basal segment not twice as long as 2nd, intercoxal process very broad, almost truncate, suture with 2nd wide, intermediates longer than 2nd or apical; apical longer than 2nd, densely punctate at apex and feebly transversely impressed. *Legs* long; posterior femora reaching apex of apical tubercles of elytra; tibia compressed, almost straight; tarsi very thin, 4th joint distinctly longer than 1st, 3rd almost simple, claws very long. Length 14, rostrum $3\frac{2}{3}$; width 6 mm.

Hab.—N.S.W. (Mr. C. French); Richmond River (Masters and Lea).

A peculiar and very distinct species; the third tarsal joint could very well be called simple; the tarsi are narrower and the intercoxal process broader than in any other species known to me; the position of the prothoracic tubercle is also very peculiar.

Group E.—Type *P. rubus*.

Large, convex, prothorax and elytra with large tubercles. Rostrum curved, scape scarcely reaching, or passing muzzle for but a very short distance. Prothorax strongly carinate or not,

with a transverse row of four large tubercles, apex broad, not produced in the middle but tuberculate above, base with small scutellar lobe. Scutellum absent. Elytra with the shoulders rather narrow, apex rounded. Femora reaching middle of posterior declivity. Third tarsal joint simple to rather broadly bilobed.

Scape scaly, short, in neither sex reaching apex of muzzle.

Prothorax with a strong carina continuous from base almost to apex where it joins in with apical constriction and forms an elongate T. Second interstice of elytra with four large tubercles. Third tarsal joint simple... *rubus*, Pasc.

Four prothoracic tubercles distinct, isolated. Elytra with three large tubercles on 2nd interstice, suture with two conjoined tubercles at summit of posterior declivity, each side of declivity with a large outwardly projecting tubercle. Two species at first sight apparently identical.

Second joint of funicle almost twice as long as 1st. Prothoracic carina distinct, elongate, at its base forming scutellar lobe. Third tarsal joint almost simple.... *intermedius*, n.sp.

Two basal joints of funicle equal. Prothoracic carina absent (to the naked eye). Sutural tubercles projecting obliquely upwards; in the preceding the projecting is almost horizontal. Third tarsal joint wide, distinctly bilobed..... *idolus*, n.sp.

These three species are so obviously congeneric that any system which would separate them can only be regarded as purely artificial.

POROPTERUS RUBUS, Pasc.; Mast. Cat. Sp. No. 5449.

Mormosintes rubus, Pasc., Journ. of Ent. ii. p. 429, t. 17, f. 15.

Moderately densely clothed all over with small roundish brown scales, none of them very elongate except on tibiae and a few on scape; muzzle partially or entirely bare. Ciliation minute, dingy.

Convex, strongly tuberculate. Head almost impunctate; rostrum with dense shallow, somewhat irregular punctures; ocular fovea small, round, deep; eyes rather finely granulate; rostrum thick, curved, feebly widening to apex (almost parallel in ♀) with trace of a very feeble carina at base; antennæ thick, scape inserted a little in front of the middle, in neither sex reaching apex of

muzzle, two basal joints of funicle elongate, equal, 2nd as long as three following combined; club subsolid, ovate, subadnate to funicle. *Prothorax* with apex feebly produced, rounded, about half the width of base; ocular lobes feeble; constriction deep, continuous to median carina (which is distinctly raised, continued to and thickest at base forming a scutellar lobe, at its apex forming with summit of constriction an elongate T); sides and base rounded, the disc and sides with numerous small rounded tubercles, a transverse row of rather large tubercles, the lateral distinct, briefly conical, the median on each side of carina large, irregular, divided in the middle; apex with a flattened tubercle on each side. *Elytra* more than twice the length of prothorax, its extreme length about twice and one-half, shoulders as wide as prothorax (excluding lateral tubercles), widest about the middle, with numerous large granules or small tubercles; 2nd interstice with four large tubercles, the 2nd from base smallest; 4th interstice with three large ones, the apical the largest; 6th interstice with a less distinct tubercle behind the basal of 4th; posterior declivity almost perpendicular, with four tubercles a little before its middle, one on the 2nd and one on the 4th; apex with two small conical tubercles or mucros on each of the 2nd interstices; with moderately large shallow punctures, more distinct at the sides. Basal segment of *abdomen* more than twice the length of 2nd; 2nd not much longer than either of the intermediates; intermediates a little longer than apical, this feebly convex; the four apical level, a little depressed below basal; the sutures between all deep and wide. *Legs* elongate; femora in ♀ reaching, in ♂ slightly passing elytra; tibiæ straight, the posterior just noticeably incurved on their upper surfaces; tarsi narrow, parallel, 3rd joint simple, 4th a little longer than 1st or the two intermediates combined. Length $17\frac{1}{2}$, rostrum 5 (vix); width 9 mm.

Hab.—Queensland (Mr. G. Masters).

POROPTERUS INTERMEDIUS, n.sp.

Upper surface more or less densely covered with minute muddy-brown scales, densest on tubercles, shining and elongate scales in

each puncture and sprinkled about; under surface and femora with sparse moderately elongate scales, densest on tibiae; head and rostrum sparsely clothed, scape with a very few towards apex. Ciliation absent.

Convex, strongly tuberculate. *Head* very feebly, the muzzle more distinctly punctate; ocular fovea almost obsolete; eyes moderately granulate, subtriangular; rostrum distinctly curved, elongate, subparallel, a feeble carina extending almost its entire length; scape inserted about two-fifths from apex, reaching or very slightly passing apex of muzzle; 2nd joint of funicle almost twice as long as 1st and longer than three following combined, 7th as long as two preceding combined, subadnate to club. *Prothorax* scarcely longer than wide, basal two-thirds subparallel; apex produced, rounded; ocular lobes slight; constriction not very deep, just visible from above; median carina extending one-third from apex to base, where it forms a small but distinct scutellar lobe; narrowly depressed at base, several almost obsolete tubercles towards base, a transverse row of four large tubercles across the middle, the median larger and a little behind the lateral; a feeble ridge extending on each side from apex to a little beyond constriction, causing the apical third to appear concave; impunctate. Extreme length of *elytra* fully thrice that of *prothorax*; base feebly bisinuate, as wide as *prothorax*, with almost obsolete granules or very small tubercles; 2nd interstice with three large tubercles, the basal largest and closer to 2nd than is the 3rd; 4th interstice with three large ones, but smaller than those of 2nd; 6th interstice with three still smaller, the basal being little better than a large granule; posterior declivity abrupt, almost at its summit with two large tubercles soldered together almost their entire length, below them on 4th interstice a large conical tubercle, apex at sides with a feeble rounded tubercle; distinctly punctate. Basal segment of *abdomen* twice as long as 2nd, feebly concave on each side near coxæ; intermediates much depressed below 2nd, which feebly encroaches upon them at its middle, distinctly shorter than apical; apical with a feeble transverse impression a little before its apex. *Legs* long; femora reaching

apex of abdomen; tibiæ straight, posterior a trifle longer than anterior; tarsi narrow, subparallel, 3rd joint almost simple, 4th as long as 1st and 2nd combined. Length 18, rostrum 5; width 8 mm.

Hab.—N. Queensland (Mr. G. Masters).

POROPTERUS IDOLUS, Faust, MS., n sp.

Densely covered with minute griseous slaty-brown scales; prothorax and punctures with a few large scales; under surface and legs with moderately sparse setose brown scales, densest on tibiæ; head and sides of rostrum with sparse elongate scales. Ciliation minute, dingy.

Convex, strongly tuberculate. *Head* feebly punctate, rostrum with moderately dense elongate shallow punctures; ocular fovea almost obsolete; eyes moderately granulate, subtriangular; rostrum feebly curved, subparallel, muzzle widening to apex, a feeble carina traceable from ocular fovea to apex; antennæ elongate; scape inserted about two-thirds from apex, slightly passing muzzle; 2nd joint of funicle feebly arcuate, slightly longer than 1st and a little longer than two following combined, 3rd longer than 4th, 7th not as long as two preceding combined, subadnate to club. *Prothorax* scarcely longer than wide, apex produced, almost truncate, more than half the width of base; constriction shallow, noticeable from above; ocular lobes slight; median carina marked by a very feeble thickening in the exact middle; scutellar lobe just traceable; three obsolete granules on each side at base, a transverse row of four tubercles across middle, the lateral more acute and smaller than median, apical ridges as elongate tubercles in a line with or a little outwards of the median (in the preceding species their apices are closer together). Extreme length of *elytra* more than twice that of prothorax, base as wide as its base, bisinuate, sides widest about the middle, much wider than prothorax; tubercles as in the preceding, but the soldered ones at summit of declivity and nearer to apical of 2nd interstice, those of the 4th on declivity narrower and more prominent, apex rounded, thickened, without small lateral tubercles. Basal seg-

ment of *abdomen* scarcely twice the length of 2nd; 2nd feebly convex, its outer apical edges rounded off; intermediates flattened, a little shorter than apical; apical feebly convex. *Legs* elongate; posterior femora scarcely reaching apex of abdomen; tibiae straight; tarsi narrow, 3rd joint rather widely bilobed, 4th not as long as two basal combined. Length $17\frac{1}{2}$, rostrum 5; width 10 mm.

Hab.—Queensland (Herr J. Faust); Tweed River, N.S.W. (Lea).

I have but one specimen of each of this and the preceding species. They strongly resemble each other, but though *P. idolus* is probably ♀, and *P. intermedius* probably ♂, I do not take them to be sexes of one species, there being too many structural differences between them.

I have recently had for examination an abraded male specimen from Herr J. Faust under a MS. name which I have adopted.

Group F.—Type *P. Chevrolati*.

Narrow, elongate-elliptic, convex, tuberculate. Rostrum almost straight, scape inserted close to apex, considerably passing muzzle, 2nd joint of funicle a little longer than 1st (in *Jekeli* double its length). Prothorax carinate; apex produced, narrow, bifurcate; usually with two tubercles on each side and one on each side of carina. Scutellum absent. Elytra widest at middle where they are usually bulged out; apex with two distinct more or less triangular tubercles touching at bases; without distinct tubercle in middle of sides of posterior declivity; shoulders narrow. Femora never reaching apex of elytra. Third tarsal joint strongly bilobed.

Prothoracic carina narrow, in the centre of a shallow depression, extending from apex to base; apex almost rounded. Elytra feebly tuberculate, apical tubercles short..... *flexuosus*, Pasc.

Prothorax without depression, without feeble traces of tubercles, carina extending from apex to base, raised, shining, very distinct. Elytra with numerous small tubercles, apical largely produced, their internal edges almost parallel..... *ellipticus*, Pasc.

Prothoracic keel dull, very short, being scarcely longer than the tubercle on each side of it, apex depressed, narrow. Elytra with moderately large tubercles, apical rather thick, divergent..... *Chevrolati*, Waterh.

Similar to the preceding but smaller, prothorax not so decidedly bulged out in the middle; apical tubercles of elytra more triangular and proportionally longer; femora decidedly shorter..... *Jekeli*, Waterh.

The smallest of the group; similar to the two preceding, but with prothoracic carina more distinct and longer, apical bifurcation very sharp, apex scarcely depressed; without strong tubercles on elytra except at base (where in the two preceding they are absent), apical tubercles similar to those of the preceding..... *astheniatus*, n.sp.

POROPTERUS FLEXUOSUS, Pasc.; Mast. Cat. Sp. No. 5426.

♂ (?). Upper surface sparsely clothed with small dark brown scales, denser, paler and more elongate on the under surface, the scales on under surface of femora and coxæ with a faint silvery lustre; tibiæ densely clothed with rather broad scales; head feebly, rostrum more densely, scape at apex feebly squamose. Ciliation very minute, silvery-yellow.

Moderately convex, elliptic, feebly tuberculate. *Head* sparsely, rostrum more densely punctate; ocular fovea small, distinct, feebly produced in front; eyes finely granulated; rostrum feebly, towards apex more strongly curved, muzzle short, wider than rest of rostrum; scape inserted about two-fifths from apex, for more than half its length passing muzzle; 1st joint of funicle short, thick, not much more than half the length of 2nd, 2nd as long as three following combined; club free. *Prothorax* about as long as wide; apex produced, rounded, about one-third the width of base; constriction shallow; base truncate; sides rounded, narrowing to base; median carina continuous from apex to base, very feeble in front, thickest in middle; apex with a feeble ridge on each side continuous to a feeble irregular tubercle in middle, irregularly areolate or shallowly foveate, scutellar lobe minute. *Elytra* about twice as long as prothorax, widest a little before

middle, where they are wider than prothorax, suddenly lessened to apex; suture, 2nd, 4th and 6th interstices feebly produced at base, the 6th and 7th with a feeble united tubercle; 2nd, 4th and 6th raised and to the naked eye feebly tuberculate, the 2nd with a feeble tubercle at summit of declivity, 4th and 6th curved at the middle, suture on declivity feebly thickened; each with a blunt produced tubercle at apex, conjoined at their bases; irregularly shallowly foveate. Basal segment of *abdomen* about twice as long as 2nd; 2nd with a transverse impression and with distinct punctures; intermediates feebly depressed, not as long as apical; apical with a feeble depression on each side. Posterior *femora* terminating at one-third from apex of abdominal segment; *tibiæ* straight; *tarsi* broad, 3rd joint rather widely bilobed, 4th longer than 1st and parallel-sided. Length 10, rostrum $2\frac{1}{2}$; width $4\frac{1}{2}$ mm.

Hab.—Port Lincoln, S.A.

I have seen but one specimen (which might be regarded as a co-type) of this species. Kindly lent me for examination by Mr. G. Masters.

POROPTERUS ELLIPTICUS, Pasc.; Mast. Cat. Sp. No. 5424.

Upper surface densely clothed with minute muddy-brown scales, a few small depressed elongate scales sprinkled here and there, granules and tubercles almost bare; under surface with more distinct scales than above; *femora* and *tibiæ* densely clothed with moderately elongate scales; head—and rostrum to muzzle—with moderately distinct scales. Ciliation minute, bright silvery-yellow.

Convex, elongate-elliptic, tubercles mostly small. *Head* and rostrum—especially the latter—densely punctate; rostrum elongate, subparallel, feebly longitudinally excavated above scrobes, with a feeble shining almost obliterated carina; *antennæ* elongate; scape inserted about two-fifths from apex, passing muzzle for about one-fourth its length; 2nd joint of funicle about once and one-third as long as 1st and as long as the three following combined; club subadnate to funicle. *Prothorax* distinctly longer

than wide, apex produced, flat, feebly bifurcate, almost one-third the width of base; constriction deep but short; a feeble ridge extending from apex to a little beyond the middle and not noticeable from above; base truncate, scarcely narrower than middle; median carina shining, very distinct, continuous from base to apex; disc with an almost obsolete tubercle on each side of carina; punctures (if present) concealed by scales. *Elytra* (with tubercles) more than twice the length of prothorax and also wider at their base, feebly widening to about the middle and thence more distinctly lessened, scarcely wider than deep, the interstices with numerous small granules larger at base and more regular towards suture; the 2nd with four small tubercles or large granules, 4th with three or four, 7th with five or six, and also one on shoulders; each with a large, elongate, triangular, feebly granulate tubercle at apex, their inner margins almost parallel, suture traceable between them; posterior declivity gradual; punctures moderately large, moderately distinct at sides, concealed by scales on disc. Basal segment of *abdomen* almost twice the length of 2nd, curved at apex; 2nd depressed at base; intermediates rather broad, fully as long as apical. Posterior *femora* terminating a little before the middle of apical segment; tibiae straight; tarsi not very broad, 3rd joint moderately bilobed, apical distinctly longer than basal. Length $14\frac{1}{4}$, rostrum 3; width 5 mm.

Hab.—N.S.W. (Mr. C. French); Illawarra (Mr. G. Masters); Burrawang (Mr. T. G. Sloane).

POROPTERUS CHEVROLATI, Waterh.; Mast. Cat. Sp. No. 5422.

♂ (?). Upper surface sparsely clothed with small dark brown or blackish scales, denser, paler and more elongate beneath; tibiae with dark elongate—interspersed with shorter and paler—scales; head feebly, rostrum more densely squamose. Ciliation minute, silvery-yellow.

Convex, elongate-elliptic, moderately tuberculate. *Head* obsoletely punctate; ocular fovea very small; eyes a little more coarsely granulate than in the preceding; rostrum rather thick, feebly curved, muzzle widening to apex, with feeble traces of

costæ, and apparently coarsely punctate; antennæ elongate, scape inserted about two-fifths from apex, passing muzzle for about one-fourth its length; 2nd joint of funicle almost twice as long as 1st and a little longer than three following combined; club large, subadnate to funicle. *Prothorax* large, a little longer than wide, apex depressed, produced, feebly bifurcate, feebly ridged at sides, not one-fourth the width of base; ocular lobes moderately prominent; constriction moderately deep, visible from above; sides in the middle subparallel on account of two almost obsolete tubercles the separation of which is just traceable, suddenly narrowed to base; median carina short, distinct, a large flattened punctate tubercle at each side of it. *Elytra* not twice as long as prothorax, widest at the middle, but even there a little narrower than prothorax at its widest; with a few feeble granules; three moderate sized tubercles on disc of 2nd interstice equidistant from each other and from their fellows, 4th with two tubercles of the same size as those on 2nd, 6th with an almost obsolete tubercle, the six appearing thus $\cdot \cdot \cdot$; each at apex with a flat-sided distinct blunt tubercle widely separated at their apices; with large and regular punctures at sides, smaller and less regular on disc, almost obsolete on declivity, which is moderately abrupt. Basal segment of *abdomen* twice as long as 2nd, 2nd feebly bulged out at sides; intermediates feebly depressed below 2nd, level with and slightly shorter than apical; apical feebly impressed towards sides. *Femora* elongate, just passing abdomen; tibiæ straight, the anterior feebly curved towards apex; tarsi rather broad, 3rd joint moderately bilobed, 4th a little longer than 1st. Length $15\frac{1}{2}$, rostrum $4\frac{1}{4}$; width $5\frac{2}{3}$ mm.

Hab.—Queensland (Mr. C. French); Tweed River, N.S.W. (Lea).

POROPTERUS JEKELI, Waterh.; Mast. Cat. Sp. No. 5430.

Densely clothed all over with microscopic muddy-green or greyish scales, interspersed (especially on tubercles and under surface) with some which are more elongate and pale brown; legs

densely clothed with short—interspersed (especially on tibiæ) with elongate—scales; head and rostrum densely squamose, the scales of various sizes. Ciliation sparse, minute, bright silvery.

Convex, elongate-elliptic, tubercles rather large. *Head* very flat, ocular fovea minute, almost concealed; rostrum elongate, feebly curved (longest in ♀), with dense shallow punctures (concealed in ♂), muzzle slightly widening to apex; antennæ elongate, inserted about two-fifths from apex in ♀, one-third in ♂, passing muzzle for one-third or half its length; basal joint of funicle thick, obconic, scarcely half the length of 2nd, 2nd elongate, slightly longer than the three following combined; club free, joints moderately distinct. *Prothorax* a little longer than wide; apex flat, produced, feebly bifurcate, about one-third the width of base; ocular lobes rather feeble; constriction deep, visible from above; base truncate; median carina short, narrow; lateral tubercles flattened outwardly, their separation distinct, the posterior subcontinuous to base; disc on each side of carina with a moderately large tubercle longer than wide, feeble granules towards base, a feeble carina from median tubercles to apex. *Elytra*—with apical tubercles—more than twice as long as prothorax, and wider at its middle, with a few small granules scattered about; tubercles of interstices as in the preceding species, except that they are a little more distinctly granulate, and the posterior of the three on the 2nd interstice a little further from the intermediate than first; apical tubercles large, triangular, moderately separated at apices; sides feebly concave, bases touching; punctures rather large, almost concealed; declivity rather abrupt. Basal segment of *abdomen* fully twice as long as 2nd, 2nd feebly convex, intermediates a little shorter than apical. *Femora* elongate, in ♂ feebly passing, in ♀ scarcely reaching apex of abdomen; tibiæ straight, intermediate very short, 3rd tarsal joint widely bilobed, 1st and 4th elongate, the latter longest. Length 11, rostrum $2\frac{3}{4}$; width $3\frac{1}{2}$ mm.

Hab.—Richmond River, N.S.W. (Lea). Originally described from Moreton Bay.

POROPTERUS ASTHENIATUS, n.sp.

Sparsely clothed above with muddy-brown and sooty-scales; under surface—except abdomen—rather densely clothed, scales rather large; legs densely clothed, scales brown, elongate, a few projecting; head densely, rostrum moderately squamose. Ciliation very minute, bright silvery.

Convex, elongate-elliptic, tubercles rather small. *Head* with ocular fovea small, usually concealed; eyes moderately granulate; rostrum almost parallel, distinctly curved, the curvature most distinct at base; antennæ not very elongate, scape inserted at less than one-third from apex, passing muzzle for more than half its length (in ♀ it is inserted farther from apex and does not extend so far); funicle with short joints, 1st obconic, 2nd not much longer and not as long as three following combined; club large, subadnate to funicle. *Prothorax* distinctly longer than wide; apex produced, narrow, acutely bifurcate, not one-third the width of base; constriction rather feeble; base truncate; anterior of the lateral tubercles only feebly noticeable, the sides behind it subparallel; median carina distinct at middle, continuous almost to apex and base, a depression on each side of it, a feeble ridge on each side reaching from bifurcation almost to median tubercles, these latter moderately distinct, elongate; a few irregular granules at base. *Elytra* distinctly punctate, including tubercles a little more than twice the length of prothorax, and wider before the middle; 2nd interstice with an elongate tubercle at base slightly projecting on to prothorax; summit of declivity (which is rather elongate) with a feeble tubercle, between them a still feebler tubercle (noticeable to the naked eye but obscured with a lens), 4th with three feeble tubercles; apical tubercles large, triangular-conjoined at bases, diverging interiorly about 60°, subparallel outwardly. Basal segment of *abdomen* fully twice as long as 2nd, 2nd feebly convex in the middle; intermediates feebly depressed, distinctly shorter than apical. *Femora* in ♂ reaching middle of apical segment, in ♀ the base; tibiæ feebly curved on their outer

edge; tarsi broad, 3rd joint rather widely bilobed, 4th not distinctly longer than 1st. Length $7\frac{1}{4}$, rostrum $1\frac{1}{2}$; width $2\frac{1}{2}$ mm.

Hab.—Blackheath, N.S.W. (Mr. G. Masters).

Group G.—Type *exitiosus*

Broad, flat, more or less tuberculate. Rostrum almost straight. Scape inserted at about one-third from apex, considerably passing muzzle. Second joint of funicle once and one-half to twice the length of 1st. Apex of prothorax narrow, produced, bluntly bifurcate; two transverse rows of four almost obsolete tubercles, without median carina. Scutellum absent. Base of elytra broad, closely applied to prothorax, shoulders with a tubercle projecting over prothorax. Legs rather short. Third tarsal joint not broadly bilobed.

Apex of prothorax bluntly bifurcate. Apex of each elytron with a distinct produced tubercle; posterior declivity marked at summit with a whitish transverse macula not reaching suture. Femora and tibiae with whitish rings... *bisignatus*, Pasc.

Prothorax distinctly bifurcate, suddenly widened a little before middle, the tubercles moderately distinct. Elytra with large tubercles, the humeral thick; 2nd interstice with three large ones, the largest on the 3rd interstice almost in a line with those on the 2nd, and situate in the middle of the posterior declivity... *exitiosus*, Pasc.

Similar to but smaller than the preceding; prothorax less suddenly widened, tubercles almost obsolete; elytra narrower and flatter, all the tubercles smaller, humeral more triangular; apical of the 3rd interstice equal in size to that of the 5th, which is a little behind it, the four forming a transverse row... *variabilis*, n.sp.

POROPTERUS BISIGNATUS, Pasc.; Mast. Cat. Sp. No. 5421.

Rather densely clothed with short brown scales, densest at apex of prothorax, each puncture with a slightly paler scale; sides at summit of posterior declivity with a whitish transverse macula extending from 3rd to 7th interstice; under surface with sparser, paler and more elongate scales than upper; scales of legs not very elongate, adpressed, femora distinctly ringed with white scales at

apex, tibiae less so at base and apex; head sparsely clothed with almost round scales, rostrum nude. Ciliation moderately elongate, bright silvery, just traceable with head in position.

Broad, flat, tubercles small. *Head* very feebly punctate, the rostrum with feeble scattered punctures; eyes moderately coarsely granulate; ocular fovea almost obsolete; rostrum shining, rather short, feebly widening to apex, almost straight; scape inserted about two-fifths from apex, passing muzzle; 2nd joint of funicle once and one-half the length of 1st and almost the length of three following combined; club free, almost circular. *Prothorax* with the disc feebly convex, the sides precipitous, and basal two-thirds parallel; apex produced, narrow, very feebly bifurcate, about one-third the width of base; ocular lobes almost obsolete; constriction absent; without median carina, but with an almost scaleless line extending from base to apex; with traces of two close transverse series of four tubercles, the basal smaller and with paler scales. *Elytra* closely applied to prothorax, not twice its length and wider at the base, widest a little behind base, about once and one half as long as wide; three callosities on each side at base, the broadest close to suture, 2nd close to shoulder, 3rd on shoulder feebly projecting on to side of prothorax; with large regular punctures giving the surface an obsoletely tuberculate appearance, two feeble rounded tubercles on 2nd interstice, one at summit of declivity (which is abrupt), the other a little larger and a short distance below it; apex with a flattened tubercle on each side, the distance between their apices a little more than the width of apex of prothorax. Basal segment of *abdomen* thrice the length of 2nd, a curved transverse impression across its apical third causing that part to appear to belong to metasternum, intercoxal process broad, a feeble longitudinal impression in middle of base; 2nd transversely convex, its sutures large and deep, not much larger than either of the intermediates, three apical depressed below level of others, intermediates a little longer than apical. *Legs* short, femora thick, posterior feebly passing abdomen; tibiae compressed, very feebly curved; tarsi rather broad, 3rd joint distinctly bilobed, 4th distinctly longer than 1st. Length 11, rostrum $2\frac{2}{3}$; width $5\frac{1}{4}$ mm.

Hab.—Illawarra, N.S.W. Described from a specimen kindly lent me for examination by Mr. George Masters. Originally described from Moreton Bay.

POROPTERUS EXITIOSUS, Pasc.; Mast. Cat. Sp. No. 5425.

Scales brown or sooty-brown, small, sparse, densest on prothorax where are also a few elongate ones about tubercles, irregular on under surface, elongate and projecting on tibiæ; head moderately clothed, rostrum—except at sides—almost nude. Ciliation short, silvery-yellow, invisible unless head be removed.

Broad, flat, tubercles large. *Head* large, flat, impunctate (larger and flatter in ♀); rostrum with regular feeble punctures; ocular fovea represented by a very small puncture; eyes moderately granulate; rostrum feebly shining, rather broad, widening to apex, feebly curved (longest and straightest in ♀); antennæ long, scape in ♂ inserted about one-fourth from apex, about two-thirds of its length passing muzzle, in ♀ inserted about two-fifths or more from apex, not half its length passing muzzle; 2nd joint of funicle almost twice as long as 1st, and a little longer than three following combined, 7th not transverse; club free, elongate, four-jointed, as long as four apical joints of funicle. Apex of *prothorax* produced, bluntly but distinctly bifurcate, about one-fourth the width of base, subtriangular to basal two-thirds, which are subparallel; ocular lobes almost obsolete; constriction just traceable, base feebly depressed at its middle, two transverse rows of four very feeble tubercles, the anterior row without the scales would be obsolete. *Elytra* scarcely twice the length of prothorax and wider at its base, widest a little in front of the middle; shoulders with a large obtuse tubercle projecting on to prothorax, 2nd interstice with three large equidistant ones, the 3rd at summit of declivity (which is abruptly rounded), 4th interstice with two smaller tubercles placed between those on 2nd, the largest tubercle of all a little before the middle of declivity on 3rd interstice, and like the others (except on shoulders) it is obtusely conical, 6th interstice with a row of six or seven feeble tubercles, and a feeble one on 7th almost at base; each side

of apex with a very feeble obtuse tubercle; with regular rows of large punctures, sutural continuous to apex and feebly diverging at base, lateral rows regular, the others distinct but somewhat interrupted by tubercles. *Metasternum* curved. Basal segment of *abdomen* as long as three following combined, a curved transverse impression across its apical third, intercoxal process very broad, suture with 2nd large, deep and curved, longest at sides of middle; 2nd transversely convex, not as long as intermediates; intermediates depressed below 2nd, and very feebly below apical, as which they are about as long; apical feebly convex. *Legs* rather long; posterior femora in ♀ scarcely reaching, in ♂ just passing elytra; tibiae thin, compressed, very feebly curved; tarsi slender, 3rd joint very feebly bilobed (almost simple), 4th a little longer than 1st. Length 12, rostrum 3; width $5\frac{1}{2}$ mm.

Hab.—Queensland (Messrs. Masters and French); Tweed and Richmond Rivers, N.S.W. (Messrs. Helms and Lea).

POROPTERUS VARIABILIS, n.sp.

Scales very small, moderately dense, brown or sooty-brown, densest and palest on prothorax, tinged with white between bifurcation, black on the anterior of median tubercles; sparse on under surface and femora, moderately elongate on tibiae; sparse on head, rostrum—except at sides—almost nude. Ciliation rather elongate, golden-yellow, visible with head in position.

Broad, flat, tubercles moderate. *Head* with a feeble longitudinal impression, impunctate, rostrum sparsely—and except muzzle—almost obsoletely punctate; ocular fovea feeble; eyes moderately granulate; rostrum feebly shining, feebly bent, muzzle widening to apex (longer, straighter and almost parallel in ♀); antennae elongate, scape in ♂ inserted about one-third from apex, about half its length passing muzzle, in ♀ a little less; 2nd joint of funicle twice as long as 2nd and as long as three following combined, 7th very little longer than wide; club free, elongate, indistinctly four-jointed, as long as or a little longer than three preceding joints. *Prothorax* longer than wide, apex produced, feebly bifurcate, about one-third the width of base; ocular lobes

feeble; constriction absent; sides triangularly widening, rounded in the middle, very feebly decreasing to base; disc feebly convex, the position of transverse tubercles (which are entirely absent) feebly marked by scales, median line not at all or very feebly marked at base and apex. *Elytra* about twice the length of prothorax, wider at the base, and widest a short distance behind it, base appearing trisinuate from a somewhat triangular projecting tubercle on each shoulder, and a thickening on each side of suture, between which rests a feeble scutellar lobe; tubercles smaller and in position somewhat different from those of the preceding, two only on disc of second interstice, one at summit of declivity, the other a little before it, largest tubercle a little before middle of declivity, distinctly on 2nd interstice but partly on 3rd, 3rd near base with a tubercle taking the place of basal on 2nd of the preceding species, 4th with two feebler ones similar in position to the preceding, and just behind largest tubercle a distinct one, seen from behind the four form a transverse row; sides with feeble tubercles, an obtuse tubercle on each side at apex; punctures a little larger and more irregular than in the preceding. Basal segment of *abdomen* very flat, almost as long as three following combined, transversely impressed near apex, 2nd shorter than intermediates, these a little longer than apical, apical in ♂ feebly transversely impressed. *Legs* moderately long; femora in ♂ reaching apex of abdomen, in ♀ middle of apical segment; tibiæ compressed, feebly curved; tarsi a little wider and the 3rd joint a little more distinctly bilobed than in the preceding species. Length 11, rostrum 3; width $4\frac{3}{4}$ mm.

Hab.—Tweed and Richmond Rivers, N.S.W. (Helms and Lea).

In all my specimens the curvature of the mesosternal receptacle differs; in one very much abraded specimen it is almost straight; the anterior portions perhaps have been worn down by friction with the coxæ and in crawling about. They are all undoubtedly conspecific but each is slightly different *inter se*; one has the humeral tubercles more distinct and with a granule at its base; in another the base is flatter; the tubercles are larger in some than in others; the size of the 2nd abdominal segment appears

subject to variation; the punctures are more irregular in some; some have the elytra wider and less convex; in several specimens one side is slightly different from the other; the depths of the abdominal sutures are also subject to variation. This species as well as the preceding (which is also slightly variable) is very common; dozens of individuals are often to be seen on old stumps at night. The species are fairly distinct from each other. The present species I take to be one in rapid course of evolution. I have a species belonging to an undescribed genus with which its affinity is very obvious.

Group H.—Type *P. varicosus*.

Elongate-cylindrical, without distinct tubercles on elytra, those on the prothorax almost or entirely obsolete. Eyes rather small, coarsely granulate. Rostrum more or less curved, often almost straight, densely squamose. Scape inserted from behind the middle to one-third from apex, passing muzzle for a considerable distance, or even not reaching apex, and varying sexually; club free or subadnate to funicle. Prothorax not much wider at base than apex, with or without a feeble carina. Scutellum absent. Elytra widest about the middle, more or less distinctly striate-punctate; 2nd and 4th interstices feebly raised at base and feebly fasciculate; suture at summit of posterior declivity slightly raised and thickened. Large shallow punctures or foveæ on the two basal and the apical segments of abdomen. Legs short; femora never passing middle of declivity, and seldom reaching so far; tibiæ rather strongly compressed, with elongate scales; third tarsal joint scarcely to moderately bilobed; claw-joint more or less elongate, widening to apex or parallel-sided, squamose or setose.

This is the most difficult group of the whole genus, all the species being closely allied; and they are certain to cause trouble to any one wishing to identify them. When captured the scales are frequently covered with earthy material; some of the species are moderately common under logs in dry situations. *P. communis* appears to be widely distributed, and of it I have seen thousands.

They are all comparatively small. For convenience the group may be split up into several divisions.

a. Scape short, inserted closer to base than apex. Elytra with distinct suberect elongate scales or setæ towards the sides and apex; suture very feebly thickened. Prothorax without carina and with less distinct setæ than elytra.

First joint of funicle thick, half the length of second.

Prothorax with a moderately distinct transverse row of four fasciculate tubercles..... *oniscus*, Pasc.

Elytra widest near base; shoulders rounded and without tubercle. Resembling but smaller than the preceding; funicle much shorter and thicker, 2nd joint not twice the length of 1st; prothorax more distinctly impressed near base, fasciculate tubercle much less distinct; elytra widest at about the middle, shoulders with a distinct tubercle, punctures or foveæ larger; claw-joint shorter..... *crassicornis*, n.sp.

b. Antennæ inserted in front of the middle; scape always passing muzzle; funicle short; club almost circular. Prothoracic carina almost or completely concealed by scales. Scales with a reddish or yellowish tinge, sometimes feebly maculate.

Prothoracic tubercles feeble and very feebly fasciculate.

Elytra with depressed elongate scales, distinct towards apex; apex of sutural thickening marked with a small velvety-black rounded fasciculate macula; base and shoulders rounded..... *difficilis*, n.sp.

Prothorax with four moderately distinct tubercles, apex feebly but distinctly bifurcate. Sutural thickening appearing as a small almost obsolete tubercle at summit of declivity; shoulders with a small tubercle projecting slightly outwards and forwards. Tibial hook very sharp and more elongate than in others of the group..... *harpagus*, n.sp.

Size rather large, body robust. Prothorax with moderately large suberect scales. Shoulders projecting feebly forwards and not at all outwards. Summit of sutural thickening distinct and rather wide, continuous almost to apex of elytra..... *varicosus*, Pasc.

Very densely clothed with scales. Prothorax with traces of tubercles only at sides. no sign of median carina. Elytra subparallel, base feebly rounded, shoulders feebly triangularly produced forward and not at all outward; second interstice not fasciculate at base, but the scales there slightly darker; sutural thickening almost obsolete..... *lutulentus*, n.sp.

c. Differs from division *b*. principally on account of the scales being more uniformly black and dingy (though specimens of *communis* are occasionally feebly multimaculate at sides and apex of elytra), and sparser, allowing the punctures to be more clearly seen. The funicle is also more elongate.

Prothorax subquadrate, not depressed along the middle (this is its strongest character), median carina shining, continuous almost to base and apex; median tubercles almost obsolete. Elytra cylindrical, sub-tuberculate on each side of summit of declivity; suture very feebly thickened, lateral punctures very distinct. A fairly distinct species..... *parallelus*, n.sp.

Prothorax depressed along the middle, carina very feeble and extending for but a short distance. Elytra less cylindrical than in the preceding: suture thickened from a little before summit of declivity, the thickening continuous almost to apex..... *communis*, n.sp.

Muzzle slightly concave. Prothorax with median carina feeble but distinctly raised, median more distinct than lateral tubercles; distinctly punctate. Elytra at base with a feeble ridge extending almost from suture to 3rd interstice; a small shining granule in front of each puncture; sutural thickening distinct. *cavirostris*, n.sp.
The most distinct species of the group.

POROPTERUS ONISCUS, Pasc.; Mast. Cat. Sp. No. 5434.

Scales as on the following but paler and denser, apex of prothorax and tubercles paler and fasciculate, elytral fascicles a little more distinct, elongate scales coarser, shorter, and paler; the ciliation also is a little more noticeable.

Convex, tubercles very small. *Head* and rostrum without visible punctures; ocular fovea concealed; eyes small, elongate,

convex, strongly granulate; rostrum curved, very feebly widening from base; scape short, thick, inserted closer to base than apex, terminating a considerable distance before apex; basal joint of funicle thick, obtriangular, 2nd elongate, almost twice the length of 1st, as long as three following combined, 7th feebly transverse; club large, free, oval, subsolid. *Prothorax* longer than wide, apex feebly produced, rounded, not much narrower than base, sides and base rounded; constriction shallow, continued across summit; ocular lobes feeble; median carina absent or at least invisible; fascicles at apex and across disc marking position of tubercles; apparently punctate. *Elytra* at base wider than prothorax and about twice as long; base and apex rounded, base depressed, shoulders without tubercle, sides subparallel; suture (especially on declivity), 3rd and 5th interstices raised; 3rd feebly produced at base; with regular rows of large punctures on disc, becoming foveæ at sides. *Abdomen* with large round deep punctures or foveæ, basal segment not twice as long as 2nd, intercoxal process broad, feebly concave, 2nd sloping down to intermediates and much longer than them; intermediates distinctly depressed, small, impunctate; apical longer than intermediates, impunctate at apex. *Legs* rather short; posterior femora not quite reaching apex of abdomen; tibiæ compressed, the anterior very feebly curved; tarsi moderately thick, 1st and 4th joints subequal, 3rd feebly bilobed. Length $8\frac{1}{2}$, rostrum 2; width $3\frac{2}{3}$ mm.

Hab.—Richmond River, N.S.W. (Lea). Originally described from Queensland.

POROPTERUS CRASSICORNIS, n.sp.

Densely covered with rather pale brown scales, prothorax with a few moderately elongate, elytra on interstices—but especially at sides and apex—with distinct elongate brown and sooty scales; the fascicles (which are just traceable to the naked eye) are composed of sooty scales; legs with elongate scales; head and rostrum densely squamose. Ciliation just traceable.

Convex, tubercles very small. *Head*, except antennæ, as in the preceding; antennæ short, thick; scape short, its insertion

distinctly nearer to base than apex; 1st joint of funicle thick, more than half the length of 2nd, 2nd widening to apex, not as long as three following combined, 3rd-7th distinctly transverse; club rather small, subsolid, almost free. *Prothorax* as in preceding, except that the fascicles are a little less and the tubercles a little more distinct, the constriction feebler. *Elytra* somewhat as in preceding, base not depressed, shoulders with a tubercle from continuation of 5th interstice, 3rd tuberculate at base; suture on declivity, 3rd and 5th interstices feebly raised; disc and sides with rows of regular foveæ. *Abdomen* as in preceding, but intercoxal process not concave, punctures or foveæ less regular, intermediates smaller, apical with almost obliterated punctures. *Legs* as in preceding, third tarsal joint still more feebly bilobed. Length $6\frac{1}{2}$, rostrum $1\frac{1}{2}$; width 3 mm.

Hab.—Tweed River, N.S.W. (Lea).

POROPTERUS DIFFICILIS, n.sp.

Densely clothed all over with minute light brown scales, each puncture of prothorax (though not visible) marked by a thick moderately elongate scale, a few also scattered about on interstices of elytra, a feeble pale stripe at base of median line; elytra with paler scales on shoulders feebly continued on to prothorax, feebly trimaculate at summit of declivity, scales of declivity a little paler than on disc and marked almost at summit with a velvety-black macula; fascicles of 2nd interstice feebly marked and several still feebler on 4th and 6th; under surface (except intermediate abdominal segments) with elongate paler scales, palest on meso- and metasternum; femora and tibiæ very feebly ringed with darker scales; head and rostrum densely squamose. Ciliation moderately elongate, bright silvery-yellow, visible with head in position.

Convex, tubercles very small. *Head* feebly convex; rostrum feebly curved (in ♀ almost straight), feebly widening to apex; scape elongate, inserted about one-third from apex, fully half its length passing muzzle (in ♀ less); 1st joint of funicle more than half the length of 2nd, 2nd as long as three following combined;

club large, free, four-jointed. *Prothorax* a little longer than wide, apex feebly produced, at constriction almost as wide as base; ocular lobes feeble; constriction deep, visible from above, not continued across summit; sides rounded and narrowing from middle to base, median carina feeble, a depression on each side at its apex; transverse row of tubercles feeble. *Elytra* not twice the length of prothorax, widest about the middle, base rounded, alternate interstices and suture on declivity feebly raised, with rows of large almost concealed punctures. Basal segment of *abdomen* about once and one-half the length of 2nd, intercoxal process feebly concave; intermediates flat, not depressed below the level and almost the length of apical. Posterior *femora* passing middle of apical segment; tibiae short, compressed, very feebly curved on their upper surface; 3rd tarsal joint moderately bilobed. Length $6\frac{1}{2}$, rostrum 2; width $2\frac{3}{4}$ mm.

Hab.—Tweed and Richmond Rivers, N.S.W. (Lea).

In this species the large abdominal punctures are so completely concealed by scales as to be invisible unless the scales be removed.

POROPTERUS HARPAGUS, n.sp.

♀ (?). Very densely clothed (densest on upper surface) with minute muddy-brown scales; prothorax with slightly elongate sooty scales at apex, on tubercles, and a few sprinkled about; elytral fascicles of 2nd, 4th, and base of 6th interstices narrow, moderately distinct; under surface (especially apical abdominal segments) and legs with feebly elongate paler scales, on the tibiae more elongate and blackish; head and rostrum densely squamose. Ciliation minute, silvery-yellow.

Convex, tubercles very small. *Head* with an elongate depression about ocular fovea; eyes round, coarsely granulate; rostrum rather slender, feebly curved, almost parallel; scape inserted about two-fifths from apex, passing muzzle for a short distance; basal joint of funicle thick, more than half the length of 2nd, 2nd not as long as three following combined, 3rd-7th transverse, 7th very wide; club large, four-jointed, almost free. *Prothorax* longer

than wide; apex produced, feebly bifurcate, about half the width of base; constriction distinct only on its lower half; sides rounded, feebly decreasing to base; median line moderately distinct, as is also the transverse row of four tubercles, the lateral however are very feeble; apparently with large punctures at base. *Elytra* fully twice the length of prothorax and wider at the base, widest a little behind the middle, then suddenly arcuately lessened to apex, which is truncate; 2nd and 4th interstices distinctly raised, curved about the middle, suture thickened on declivity; with regular rows of large punctures almost concealed by scales. Basal segment of *abdomen* about once and one-half the length of 2nd, intercoxal process broad, flat, rounded in its middle, suture between 1st and 2nd rather feeble; intermediates flat, not quite as long as 2nd or apical, and not depressed below their level. Posterior *femora* passing intermediate segments; tibiae feebly curved, the anterior more noticeably; tarsi subparallel, rather thick, 3rd joint not distinctly bilobed. Length $8\frac{1}{2}$, rostrum $1\frac{3}{4}$; width 4 mm.

Hab.—New South Wales (Mr. J. Kershaw, Senr.); Australia (Herr J. Faust).

The abdominal punctures are as in the preceding species.

POROPTERUS VARICOSUS, Pasc.; Mast. Cat. Sp. No. 5444.

♂. Densely covered with small brown scales, densest on prothorax, especially on tubercles and apex; prothorax with a few slightly more elongate; elytra with blackish scales forming small but noticeable fascicles almost at base and middle of 2nd, feeble and smaller on 4th and 6th interstices, but most distinct at summit of sutural thickening (towards its apex becoming paler); under less densely clothed than upper surface, mixed (as also the legs) with slightly paler elongate scales; head and rostrum densely squamose. Ciliation moderately elongate, sparse and dull.

Convex, tubercles very small. *Head* feebly convex; eyes rounded, coarsely granulate; ocular fovea not visible; rostrum moderately long and slender, almost parallel; scape inserted about two-fifths from apex, just passing muzzle; basal joint of funicle slightly shorter than 2nd. *Prothorax* as long as wide;

apex feebly produced, rounded, about half the width of base; ocular lobes moderately prominent; constriction feeble, scarcely visible from above; basal two-thirds almost parallel, not much wider than apical third, but suddenly increasing at constriction; median carina small but moderately distinct; transverse tubercles feeble, the median largest, an obtuse ridge on each side at apex.

Elytra more than twice the length of prothorax, and wider at base, much wider a little before the middle; sides arcuately curved near apex, 2nd, 4th and 6th interstices feebly produced at base, 7th (shoulder) more distinctly; posterior declivity abrupt, on it the suture is thickened especially at summit, apex very feebly produced, truncate, but appearing (in consequence of density of scales) as if with a very feeble tubercle at each side; with regular rows of large punctures or foveæ almost concealed by scales. *Metasternum* a little shorter than in the preceding. *Abdomen* with sutures apparently feebly marked, but seen to be very distinct when scales are removed, basal segment not once and one-half the length of 2nd, its suture with that segment curved in the middle; intercoxal process broad, flat; 2nd flatly sloping to intermediates, and longer than them; apical longer than and a little elevated above intermediates, its apex truncate. *Legs* short; femora thick, posterior almost reaching apex of abdomen; tibiæ feebly curved on both their edges, the anterior a little more noticeably, posterior (if anything) a little longer than anterior; 3rd tarsal joint a little more widely bilobed than in the preceding. Length 11, rostrum 3 (vix); width $4\frac{1}{2}$ mm.

Hab.—Illawarra, N.S.W.

* A rather robust species, for the opportunity of describing which I am indebted to Mr. G. Masters. The specimen lent me might be regarded as a co-type.

I have recently received a number of specimens of this species from Mr. T. G. Sloane. An examination of several abraded specimens discloses the fact that the abdominal punctures are much larger than is usual in the group.

POROPTERUS LUTULENTUS, n.sp.

Very densely clothed all over with microscopic muddy-brown scales, prothorax with elongate sooty scales just showing; elytral fascicles just traceable; under surface and legs sprinkled with larger paler scales which are scarcely longer than wide; head, rostrum and claw-joint densely, scape and pectoral canal slightly squamose. Ciliation minute, pale silvery-yellow.

Convex, tubercles very small. *Head* feebly convex; eyes rounded, coarsely granulate; ocular fovea invisible; rostrum rather short, almost straight and parallel; scape inserted about two-fifths from apex, passing muzzle, apex a little more suddenly thickened than is usual in the group; 1st joint of funicle obconic, almost as wide as long, 2nd about once and one-half the length of 1st, and not as long as three following combined, 3rd-6th scarcely, the 7th distinctly transverse; club short, almost free. *Prothorax* feebly convex, distinctly longer than wide; apex produced, almost truncate, more than half the width of base; constriction feeble; sides feebly rounded in the middle, decreasing a little less to base than to apex; transverse tubercles scarcely traceable, the lateral (if anything) a little more distinct, median carina just visible, sides at apex with a feeble ridge; with large punctures entirely concealed by scales. *Elytra* a little more than twice the length of prothorax and with the base a little wider, very feebly widening to apical third; declivity abrupt; suture feebly thickened; apex rounded, 2nd interstice and shoulders feebly but distinctly produced; with regular rows of foveæ nearly touching, but almost entirely concealed by scales. Basal segment of *abdomen* not once and one-half the length of 2nd, intercoxal process broad, its sides very feebly raised; 2nd flat, sloping towards intermediates, its sutures almost entirely concealed; intermediates very feebly depressed below apical and not as long; apical with trace of a feeble transverse impression. Posterior *femora* long and rather thin, reaching middle of apical segment; tibiæ compressed, anterior very feebly curved and a little shorter than posterior; tarsi sub-

parallel, 3rd joint almost simple. Length $7\frac{4}{5}$, rostrum $1\frac{2}{3}$; width $3\frac{2}{3}$ mm.

Hab.—Manning River, N.S.W. (Miss S. Dumbrell).

In this species the posterior femora are thinner than in any other of the group; the 3rd tarsal joint is no wider than the 2nd; the posterior tibiæ are very little longer than the anterior, but at the first glance the difference is noticeable. My specimen is remarkably dingy in appearance, but I have satisfied myself that it is entirely due to the scales and not to any extraneous matter. The abdominal punctures in this and the following species are probably present, but cannot be seen on account of the density of the scales by which they are covered.

POROPTERUS PARALLELUS, n.sp.

Above clothed with microscopic sooty scales with sparse black or sooty-brown scales, most noticeable at apex of prothorax; on the under surface and legs the scales are sooty-black, denser and larger than above; head with minute scales, rostrum almost bare. Ciliation very sparse and minute, silvery.

Slightly convex, cylindric, almost nontuberculate. *Head* with trace of ocular fovea; eyes round, coarsely granulate; rostrum densely and somewhat irregularly punctate, elongate, slender, very feebly curved, almost parallel-sided; scape inserted about two-fifths from apex; passing muzzle; 2nd joint of funicle not once and one-half the length of 1st, and as long as three following combined, 3rd-6th globular, 7th transverse; club short, almost free. *Prothorax* almost flat, subquadrate; apex feebly produced, truncate, not much narrower than base; ocular lobes almost obsolete; constriction very feeble; median carina narrow, flat, continuous from near base almost to apex, a feeble ridge on each side at apex; transverse row of tubercles almost obsolete; with dense and rather small punctures. *Elytra* more than twice the length of prothorax, and very little wider, sides almost parallel to near apex, fully as deep as wide; 2nd interstice very feebly raised, a very feeble tubercle on it at summit of declivity; apex

rounded; base very feebly emarginate; with close regular rows of large punctures, the rows feebly curved about the middle; sides flattened. *Abdomen* flat, basal segment scarcely once and one-half the length of 2nd; 2nd very slightly above level of intermediates, these rather long, nearly the length of apical. *Legs* rather slender; posterior femora almost reaching apex of abdomen; tibiae compressed, feebly but distinctly curved; tarsi slender, 3rd joint rather feebly bilobed, 4th slightly longer than 1st. Length $9\frac{1}{2}$, rostrum 2; width $3\frac{2}{3}$ mm.

Hab.—Mt. Kosciusko, N.S.W. (Mr. W. E. Raymond).

POROPTERUS COMMUNIS, n.sp.

Clothed with minute muddy- or sooty-black scales; prothorax with elongate blackish scales, at the sides and on each side of carina with muddy-brown scales forming scarcely traceable lines; apex and tubercles more or less feebly fasciculate; elytra with 2nd interstice feebly fasciculate, usually for but a short distance but sometimes to sutural thickening (σ specimens occasionally have muddy-brown scales forming numerous small maculae towards sides and apex); under surface more densely clothed than upper, scales larger and paler; head and rostrum densely squamose. Ciliation feeble, dull pale yellow, slightly visible with head in position.

Convex, subcylindric, tubercles small. *Head* without visible punctures; smaller and more convex in σ ; ocular fovea small; eyes round, coarsely granulate; rostrum in σ thick, curved, in φ almost straight, thinner and almost parallel-sided, coarsely and irregularly punctate, with a feeble carina extending from fovea almost to apex; antennae rather thick; scape in σ inserted about two-fifths from apex, in φ a little more, in σ slightly passing, in φ not reaching apex; 1st joint of funicle almost as wide as long, 2nd about once and one-half the length of 1st, and not as long as three following combined, 3rd-6th almost transverse, 7th as wide as club (which is small), and almost adnate to it. *Prothorax* very little longer than wide, flattened; apex produced, rounded, about two-thirds the width of base; ocular lobes moderately prominent;

constriction narrow, deep (in some specimens almost concealed), visible from above; sides rounded, feebly decreasing to base; median carina short, feeble, a feeble line continued from it to apex and another to base; with several short longitudinal scarcely traceable ridges at base and apex, those near base apparently caused by feeble granules or punctures; a transverse row of four very feeble tubercles, the lateral slightly anterior to the median; sides with large and distinct punctures. *Elytra* not twice the length of prothorax, and not as wide as base, very feebly widening to about the middle; 2nd and 4th interstices raised and very feebly produced at base; suture thickened from a little before summit of declivity (which is abrupt); apex almost truncate; with regular rows of large distinct punctures or foveæ (larger and almost touching in ♂). Basal segment of *abdomen* very slightly concave, with large punctures almost concealed by scales, scarcely once and one-half the length of 2nd, intercoxal process triangularly produced; 2nd feebly convex, at middle feebly produced on to basal, intermediates flat, on a level with and as long as apical; apical in ♂ feebly impressed at sides and across middle. *Legs* moderately stout; posterior femora in ♂ almost reaching apex of abdomen, in ♀ reaching middle of apical segment; tibiæ compressed, posterior longer than anterior, the anterior feebly curved; tarsi almost parallel, 3rd joint almost simple and scarcely wider than 2nd, 4th thick, free for almost its entire length, anterior claws less divergent than the others. Length $10\frac{1}{2}$, rostrum $2\frac{1}{4}$; width 4 mm.

Hab.—Armidale (Mr. D. McDonald); Orange (Mr. Horace W. Brown); New South Wales (Rev. T. Blackburn, No. 6193); Glen Innes, Forest Reefs, Richmond River (Lea).

A slightly variable species; I have a number of pairs taken *in cop.*; the ♂ is generally smaller than the ♀, has the shoulders narrower and the elytra more rounded; one large ♀ specimen has the shoulders distinctly produced at base. A very small starved ♂ (l. $6\frac{1}{2}$, r. $1\frac{1}{2}$, w. $2\frac{4}{5}$ mm.) has the ridges at base of prothorax abundantly distinct; there are three on each side, the outer longer than the inner; the median carina is continuous to base; the specimen appears to be

slightly abraded; another starved ♂ has the elytra broadest behind the middle, a feeble carina on each side between lateral and median tubercles of prothorax (which are scarcely traceable); the two basal segments in both specimens have large distinct punctures—in normal forms they are shallower and almost completely hidden—and the apical is semicircularly impressed at apex. Where a species is so abundant in specimens as the present it is only reasonable to expect to take starved specimens occasionally, and that the two specimens here mentioned *are* starved I am quite satisfied.

POROPTERUS CAVIROSTRIS, n.sp.

Densely clothed with microscopic muddy-green or brown scales, prothorax and elytra with sparse elongate blackish or brown scales; under surface with irregular moderately elongate scales; legs with projecting elongate scales; head and rostrum densely squamose. Ciliation sparse, moderately elongate, feebly traceable with head in position.

Convex, subcylindric, tubercles small. *Head* feebly convex; eyes round, coarsely granulate; ocular fovea concealed; rostrum rather long, thick, distinctly curved, parallel to muzzle (which is somewhat concave) with traces of feeble ridges down the middle and sides; scape inserted very slightly in advance of the middle, just passing muzzle; 2nd joint of funicle almost twice the length of 1st, and slightly longer than three following combined, 3rd-7th distinctly longer than wide; club free, elongate. *Prothorax* longer than wide, apex produced, rounded, more than half the width of middle, from behind appearing feebly bifurcate; ocular lobes prominent; constriction deep, very distinct from above; sides rounded, median carina narrow, distinct at middle, vanishing near base and apex; transverse row of tubercles feeble; apex with a feeble ridge on each side; base and sides with shallow foveæ. *Elytra* a little wider than prothorax, and about twice the length; disc with regular rows of shallow punctures, in front of each of which is a small and distinct granule, sides with deeper punctures and without granules, base with a ridge extending

almost from suture to 3rd interstice; 5th interstice very feebly produced at base, 3rd, 5th and 7th very feebly raised near base, middle and near apex; suture distinctly thickened at summit of declivity (which is abrupt), decreasing towards apex; apex narrow, truncate. Mesosternal receptacle rather feebly curved. Basal segment of *abdomen* about once and one-half the length of 2nd, broad, feebly depressed in the middle, intercoxal process raised at sides and with distinct punctures, suture between 1st and 2nd deep at the sides, partially concealed in the middle; 2nd with a deep transverse impression near its apex causing the intermediates to appear (to the naked eye) to be three in number; intermediates very feebly depressed below apical (as which they are little more than half as long), flat, their sutures deep and narrow; apical with large shallow punctures. *Legs* moderate; posterior femora reaching middle of apical segment; tibiæ compressed, anterior feebly, the posterior still more feebly curved, intermediate straight; 3rd tarsal joint distinctly bilobed, 4th longer than 1st. Length $9\frac{3}{4}$, rostrum $2\frac{1}{2}$; width $3\frac{3}{4}$ mm.

Hab.—Tweed River, N.S.W. (Lea).

I have three very distinct species, widely separated from each other and which cannot be referred to any of the foregoing divisions.

P. MORBILLOSUS, Pasc.—Approaching the *sphacelatus*-division. Subparallel, densely squamose. Rostrum almost straight. Antennæ elongate, scape inserted about one-third from apex, considerably passing muzzle. Prothorax without carina and with very feeble traces of tubercles, apex produced but not acute, about one-third the width of base, basal three-fourths subparallel. Elytra closely applied to prothorax, with numerous irregular small tubercles. Femora short and thick; posterior tibiæ very short, third tarsal joint moderately bilobed.

P. CONIFER, Boh.—Approaching the *Chevolati*-group through *flexuosus*; the *rubus*-group through *intermedius* and *idolus*; the *succisus* through *succisus*, but very distinct from any of them. Rostrum curved. Antennæ elongate; scape inserted about two-fifths from apex, passing muzzle. Prothorax with a feeble carina

continuous from base to apex; apex rounded, not much narrower than base. Scutellum absent. Elytra ovate, base depressed, shoulders obsolete, small tubercles on 2nd, 5th and 7th interstices; the 2nd about the middle of posterior declivity with large conical tubercle conjoined at base; apex rounded. Femora scarcely reaching base of posterior tubercles; 3rd tarsal joint moderately bilobed.

P. FASCICULATUS, n.sp.—I think this species should be referred to *Poropterus* though at first sight it has more the appearance of a *Tragopus*. It may be easily identified on account of its smooth almost impunctate surface; elytra with four distinct and several smaller fascicles of blackish elongate scales or setæ; claw-joint densely covered with minute scales, &c.

POROPTERUS MORBILLOSUS, Pasc.; Mast. Cat. Sp. No. 5432.

Very densely clothed all over with roundish or moderately elongate light brown scales, densest on head and prothorax, where also (except in middle of latter) they are paler; punctures with a larger and paler scale; under surface with denser, paler and not much more elongate scales than prothorax; tibiæ with darker and elongate scales; rostrum—except basal third—almost bare. Ciliation almost microscopic, silvery.

Convex, subcylindric, tubercles small and irregular. *Head* slightly convex; ocular fovea invisible; eyes coarsely granulate, produced in front; rostrum long, almost straight and parallel, densely punctate, with traces of feeble carinæ between scapes; antennæ long; scape inserted at about one-third from apex, passing muzzle for a considerable distance; 2nd joint of funicle almost twice the length of first, and as long as three following combined, 7th feebly transverse; club free, elongate. *Prothorax* longer and deeper than wide; apex produced, rounded; extreme apex about one-fourth the width of base, obliquely widening to basal two-thirds, which are parallel; ocular lobes feeble; constriction feeble, continued as a shallow depression across summit; without visible median carina but a median line continuous to base and apex, with traces of transverse rows of obtuse tubercles, apex with a ridge on each side. *Elytra* parallel to near apex, slightly wider

than and about twice the length of prothorax, deeper than wide, base truncate; suture thickened at base and less distinctly on declivity; 2nd and 4th interstices with rows of small round tubercles, about five or six on each terminating a little below summit of declivity (which is abrupt), sides near shoulders with traces of feeble tubercles; lateral declivity with five regular rows of large punctures; disc apparently with rows of concealed punctures; apex rounded. *Abdomen* flattened, sutures partially concealed by scales, 1st segment twice as long as 2nd, intercoxal process rather narrow; intermediates depressed below general level, as long as 2nd but not as long as apical. *Femora* long, posterior almost reaching apex of elytra; tibiæ straight, short, posterior shortest of all; tarsi subparallel, third joint feebly bilobed. Length 13, rostrum $3\frac{3}{4}$; width 5 mm.

Hab.—Richmond River, N.S.W. (Lea). Described by Pascoe from Tasmania.

In the majority of species I have examined, the intermediate tibiæ are decidedly the shortest; in this species they are a trifle longer than the posterior.

POROPTERUS CONIFER, Erichs.; Mast. Cat. Sp. No. 5465.

Acalles conifer, Erichs.; *P. conifer*, Bohem., No. 5423; *P. prodigus*, Pasc., No. 5437.

Elytra sparsely clothed with short to very minute pale brown scales, prothorax with denser and longer scales, under surface with elongate scales; legs moderately densely clothed, the scales paler, denser and more elongate towards apex of tibiæ; head sparsely clothed, rostrum almost bare! Ciliation dense, very minute, bright silvery-yellow.

Convex, tubercles mostly rather small. *Head* flattened; ocular fovea long; eyes moderately granulate, apex produced; rostrum feebly curved, densely punctate, especially on muzzle, basal two-thirds parallel; antennæ thin; scape inserted about one-third from apex, passing muzzle; two basal joints of funicle as long as the rest, including club, 1st a little longer than 2nd, 2nd not as long as three following combined, 7th transverse; club short,

almost free. *Prothorax* convex, longer and deeper than wide; apex produced, subtruncate, not much narrower than base, sides rounded, decreasing to base; ocular lobes feeble; constriction shallow, near bottom deep, near top visible from above and continued across summit; median carina narrow, continued from base to constriction, a line continued thence to apex, a transverse row of four feebly rounded tubercles, the lateral slightly in advance of the median. *Elytra* ovate, more than twice the length of and at base narrower than prothorax, before the middle almost twice as wide; base depressed; sides with two rows of almost regular punctures, the rest feeble and irregular, small granules at base of suture and summit of declivity; on each side near summit of declivity a large conical tubercle conjoined at base, 2nd interstice with three small, round but distinct tubercles, equidistant from each other, 4th also with three less separated, the middle one of which is level with the middle one of 2nd interstice, 6th interstice with a feeble ridge about basal third, a feeble tubercle at junction of 4th and 6th; apex rounded. Basal segment of *abdomen* almost twice the length of 2nd, its suture with that segment distinct only at sides (on account of scales); intermediates feebly convex, their sutures deep and distinct, longer than 2nd but not as long as apical, below which they are very feebly depressed, apical with an almost obsolete transverse impression, apex distinctly punctate. *Legs* long and rather thin; posterior femora reaching middle of apical segment; tibiae compressed, feebly bent; tarsi slender, 3rd joint moderately bilobed. Length 13, rostrum $3\frac{1}{2}$; width 6 mm.

Hab.—Tasmania (Rev. T. Blackburn and Mr. A. Simson); N.S.W. (Mr. Horace W. Brown); "Australia Pipitz" (Herr J. Faust, No. 13). Described from Tasmania by Erichson and Boheman, and from Eclipse Island (*prodigus*) by Pascoe.

The description here given is from a Tasmanian specimen. I have a number of others which, though evidently conspecific, are all slightly variable *inter se*. The prothoracic carina in some specimens is distinct and short, in others it is more elongate and less distinct, in one specimen it is just traceable. The elytral

tubercles vary greatly in size, sometimes being wide and rather feebly elevated, in others smaller and much more distinct; in all the specimens, however, the two large tubercles towards the apex are very distinct. The small apical mucros are occasionally absent. The rostrum between the antennæ is either slightly rounded or with a feeble carina. The scales vary in colour from a uniform grey to the reddish-brown of *rubus*.

POROPTERUS FASCICULATUS, n.sp.

Sparsely clothed with small muddy-brown scales, prothorax with a few elongate scales in the middle and at apex; each elytron with five round fascicles of blackish setæ, the two most distinct would be on the 2nd interstices, the 1st a little closer to 2nd than base, the 2nd at summit of declivity, a little before middle of declivity a small elongate one, on 4th interstice slightly in front of the larger fascicles still smaller ones, traces of others still more minute; abdominal segments, coxæ and trochanters more densely clothed than upper surface, the scales moderately elongate; tibiæ with elongate scales, a few still narrower on under surface of femora; rostrum entirely clothed, the scales at the sides moderately elongate. Ciliation very minute, silvery-brown.

Cylindric, nontuberculate. *Head* convex and (as well as rostrum) densely punctate; ocular fovea not traceable, eyes moderately granulate, apex produced; rostrum distinctly curved, thick, parallel to scape, then distinctly widened; scape inserted about two-fifths from apex, just passing muzzle; funicle thick, 1st joint longer and thicker than 2nd, 2nd as long as two following combined, 3rd-7th transverse; club short, thick, subadnate to funicle. *Prothorax* convex, longer than wide, apex feebly produced, not much narrower than wide; ocular lobes feeble; constriction very feeble, sides rounded; with a small distinct and flat scutellar lobe. *Elytra* no wider than prothorax and not twice its length, parallel-sided, deeper than wide; sides feebly punctate-striate; disc with traces of rows of punctures, base with a shining transverse ridge at sides of scutellar lobe, between it and shoulder a smaller less shining one; shoulders feebly pro-

duced; apex almost truncate. Basal segment of *abdomen* more than twice the length of 2nd, posteriorly produced on to middle of 2nd, intercoxal process long, its sides feebly raised; four apical segments level, each of the intermediates fully as long as 2nd at its middle, apical as long as intermediates. *Legs* long; posterior femora reaching extreme apex of elytra; tibiae feebly compressed, straight; tarsi subparallel, flattened, 3rd joint feebly bilobed, 4th distinctly longer than 1st. Length 11, rostrum $2\frac{1}{3}$; width $4\frac{1}{4}$ mm.

Hab.—N. Queensland (Mr. G. Masters).

The following species are not known to me:—

P. PYTHON, Pasc., Cist. Ent. ii. 1881, p. 599; (Mast. Cat. 5438).

Hab.—Port Bowen, Queensland. Pascoe says that “in outline this species resembles *P. rubetra*, Boh. [= *Acalles rubetra*, Er.]” It may be possible that neither of them is to be referred to *Poropterus*.

P. INOMINATUS, Pasc., Ann. Mag. N. H. (4) xi. 1873, p. 197; (Mast. Cat. 5429).

Hab.—Queensland.

P. MUSCULUS, Pasc., Journ. Linn. Soc. Zool. xi. 1872, p. 483; (Mast. Cat. 5433).

Hab.—Tasmania. Pascoe says of it “sutura [abdominis] prima obliterata,” and “but the first suture, dividing the two [basal abdominal] segments, is only slightly apparent on the sides”—characters which suggest a doubt whether the species is correctly referable to *Poropterus*.

P. SATYRUS, Pasc., Ann. Mag. N. H. (4) xi. 1873, p. 197; (Mast. Cat. 5439).

Hab.—Tasmania. Pascoe says of it “segmento ultimo abdominis tribus præcedentibus conjunctim longitudine æquali,”—in my opinion, therefore, but doubtfully referable to *Poropterus*.

P. FOVEIPENNIS, Pasc., Journ. Linn. Soc. Zool. xi. 1872, p. 484; (Mast. Cat. 5427).

Hab.—Illawarra, N.S.W. Pascoe states, "prothorace subobcordato, supra planato, antice valde producto, apice anguste rotundato, basi prope scutellum fortiter biimpresso." In my opinion this insect will have to be placed in a new genus, along with several other species known to me, at present undescribed.

P. TETRICUS, Pasc., Ann. Mag. N. H. (4) xiii. 1874, p. 412; (Mast. Cat. 5442).

Hab.—Gayndah, Q. Pascoe says of the prothorax, "utrinque angulato-producto, basi profunde bisinuato" and "strongly and angularly expanded at the sides." Another character he gives is "abdomine segmentis duobus basalibus peramplis." The characters quoted seem to me to exclude the species from *Poropterus*.

Under this name Mr. Chas. French has lent me two specimens from Gayndah, which agree in nearly all particulars with Pascoe's description. But I should at once refer these to the genus *Paleticus*, Pasc.

The two species following were received too late to be dealt with in the tables given.

POROPTERUS ORTHODOXUS, n.sp.

Upper surface sparsely clothed with small suboval scales closely adpressed to derm; of a dingy black colour, except on prothorax where they assume in places a dull ferruginous tint especially in middle and at sides of apex; about the middle there is a feeble attempt at fascicles of dark ferruginous scales; each elytral puncture carries a larger scale, which towards the suture are black, becoming ferruginous towards sides; in the middle the interstitial scales are darker than the lateral. Under surface more evenly clothed than upper, the scales smaller, more elongate and suberect, black, becoming ferruginous on sides of abdomen, on mesosternal receptacle, coxæ, trochanters and tarsi. Head rather densely clothed with black and ferruginous scales, rostrum carrying a rather smaller scale in each puncture, towards the apex becoming small setæ; mouth parts fringed with sparse moderately long testaceous setæ. Ciliation composed of about a dozen short, bright, dark yellow hairs.

Convex, tubercles almost obsolete. *Head* flattened, impunctate; ocular fovea obsolete. *Eyes* moderately granulate, subtriangular. *Rostrum* parallel to insertion of antennæ, widening thence to apex, thicker and more noticeably curved in ♂ than ♀, with irregular rows of shallow moderately large punctures in ♂, in ♀ the punctures are smaller, deeper and less numerous, muzzle with three obtuse carinæ in ♂, with but one and that more distinct in ♀; mandibles shining, impunctate in front. *Scape* dull, slightly setose, widening to apex, considerably passing muzzle. Two basal joints of funicle moderately elongate, in ♂ 2nd once and one-half the length of 1st, in ♀ not so long and both thicker, the 1st in ♀ obtriangular, in ♂ subcylindric, 3rd-7th globular; club free, suboval, feebly articulated. *Prothorax* slightly longer than wide; apex produced, about half the width of base, very feebly bifurcate; constriction deep, on sides only; ocular lobes slightly produced, right-angled; sides rounded, decreasing to base; disc without granules and almost or quite non-tuberculate; punctures very feeble, almost microscopic, without carina, not depressed along median line but appearing so on account of partial absence of scales. *Scutellum* absent. *Elytra* scarcely wider and more than twice the length of prothorax, subcylindric, with moderately large irregular subtriangular rather distant punctures, in irregular double rows close to suture, becoming larger and forming five regular lateral rows; 3rd, 5th and 7th interstices raised, the 3rd forming feeble tubercles (noticeable only when viewed from the side) towards summit of declivity, posterior declivity at angle of about 45°, the suture from slightly below its summit distinctly raised and cristate; apex feebly mucronate. *Pectoral canal* deep and wide, its anterior edge densely fringed with testaceous moderately elongate setæ. *Abdomen* flattened in the middle, all the sutures very distinct, basal segment fully twice the length of 2nd; intermediates conjointly slightly longer than 2nd or apical. *Legs* thick, moderately long, posterior femora curved, in ♂ passing middle of apical segment, in ♀ just reaching middle; tibiæ short, compressed, almost straight; 3rd tarsal joint feebly bilobed, almost simple, claw-joint longer than 1st, setose and squamose,

claws long and thin, widely separated. Length $13\frac{1}{2}$, rostrum 4; width $5\frac{1}{2}$ mm.

Hab.—Burrawang, N.S.W. (Mr. T. G. Sloane).

In outline this species strongly resembles *P. morbillosus*, but it may be distinguished from that species by its much sparser and differently coloured clothing, smaller tubercles, crested apical portion of suture, mucronate apex of elytra, shorter rostrum—more suddenly enlarged at apex—shorter and thicker antennæ, less regularly punctured rostrum, longer posterior and anterior tibiæ and shorter intermediate, with numerous other but less noticeable differences.

POROPTERUS BITUBERCULATUS, n.sp.

Moderately densely clothed with soft, suberect, suboblong, moderately large, muddy-brown scales, larger on prothorax than on elytra; on the former forming six feeble fascicles, two apical, and four forming a median transverse row. Elytra with four small fascicles, two close to base and two near summit of posterior declivity. Legs, head and rostrum (except muzzle) more uniformly and rather more densely clothed than elsewhere. Ciliation short, sparse, silvery-yellow.

Convex, elliptic, punctate. *Head* slightly convex, ocular fovea feeble, almost concealed; eyes rather more strongly granulate than is usual in the genus, apex produced; rostrum rather slender, moderately curved, almost parallel to apex, with regular punctures 'smallest on muzzle. Antennæ entirely red, slender, scape curved, in ♂ passing, in ♀ reaching apex of muzzle. Two basal joints of funicle elongate, the 2nd scarcely more than half the length of 1st, 3rd-6th subglobular, 7th distinctly transverse; club short, joints moderately distinct. *Prothorax* subglobular; apex feebly produced, more than half the width of base, entire but appearing bifurcate on account of fascicles; constriction obsolete; disc and sides with rather large, regular, round, dense, shallow punctures, becoming denser and much smaller beneath fascicles, a narrow distinct median carina continuous from apical fourth to base. *Scutellum* absent. *Elytra* about twice the length of and

slightly wider than prothorax, shoulders rounded, apex entire, suture nowhere raised; each with ten rows of rather large regular punctures, scarcely larger and more regular at sides than near suture, but becoming smaller and more elongate towards apex, each carrying a scale; interstices not raised, tuberculate or granulate, wider than punctures and feebly punctate; on each side of and close to suture at base a small but very distinct shining tubercle suddenly elevated, and (in some specimens) rather irregular at apex. *Under surface* with rather dense, regular, moderately large and circular punctures, entirely absent on intercoxal process, and scarcer on metasternum and basal segment of abdomen than elsewhere. *Abdomen* uniformly feebly convex, all the sutures distinct, basal segment about once and one-half the length of 2nd; intermediates conjointly shorter than 2nd, and longer than apical. *Legs* moderate; posterior femora in ♂ just passing intermediates, in ♀ not quite passing; tibiæ straight, compressed, thicker in ♂ than ♀; 3rd tarsal joint rather widely bilobed, reddish, claw-joint setose, no longer than 1st. Length 7, rostrum 2 (vix); width $3\frac{1}{4}$ mm.

Hab.—Victorian Mountains (Rev. T. Blackburn, No. 6194).

A very distinct species belonging to the *varicosus*-group, from any of which it may be distinguished by its very regular punctures and the two basal tubercles of elytra. I have one specimen resembling *P. antiquus* in miniature. In some specimens the punctures appear to be larger than in others, and as each puncture carries a large scale, those on the abdomen, base of rostrum and beneath fascicles cannot be seen unless the scales be removed.

DESCRIPTIONS OF SOME NEW ARANEIDÆ OF NEW
SOUTH WALES. No. 8.

By W. J. RAINBOW.

(ENTOMOLOGIST TO THE AUSTRALIAN MUSEUM.)

(Plates xvii.-xviii.)

Family EPEIRIDÆ.

Genus EPEIRA, Walck.

EPEIRA PALLIDA, sp. nov.

(Plate xvii., fig. 1.)

♀. Cephalothorax 4 mm. long, $3\frac{1}{2}$ mm. broad; abdomen 9 mm. long, 6 mm. broad.

Cephalothorax yellowish-brown, hairy. *Caput* high, arched, truncated in front, sides and base clothed with long coarse hoary hairs, apex sparingly furnished with short hoary pubescence. *Clypeus* broad, strongly arched, thickly clothed with long coarse hoary hairs; lateral radial grooves indistinct, median groove or cleft deep, short, strongly curved, the curvature directed backwards. *Marginal band* narrow.

Eyes glossy black; the four comprising the median group are seated on a tubercular eminence, forming a trapezium; those of the front row separated from each other by about twice their individual diameter, and those of the second row by a space equal to rather more than one diameter; the two rows separated from each other by about two and a half diameters; side eyes minute, seated obliquely on small tubercles, not contiguous.

Legs yellowish-grey, with somewhat darker annulations, moderately long, strong, clothed with short hoary hairs, and armed with short, strong, black spines; relative lengths 1, 2, 4, 3.

Palpi short, similar in colour and armature to legs, tips black.

Falces glossy, yellowish, inner margins fringed with short black hairs.

Maxillæ short, yellowish, inclining inwards, arched; sides clothed with short hoary hairs at their base.

Labium concolorous, short, broader than long.

Sternum shield-shaped, dark brown, thickly clothed with hoary hairs.

Abdomen ovate, pale yellow, boldly projecting over base of cephalothorax, two small tubercles seated laterally near anterior extremity; superior surface ornamented with a network of tracery, barely visible to the naked eye; in addition to this there are six small punctures arranged in pairs; sides olive-green, inferior surface yellowish-grey.

Epiptyne a simple slightly curved transverse slit, at the centre of which on the upper lip there is a small, blunt, dark brown protuberance.

Hab.—Guildford.

EPEIRA CRASSIPES, sp. nov.

(Plate XVII., figs. 2, 2a.)

♀. Cephalothorax $5\frac{1}{2}$ mm. long; 5 mm. broad; abdomen 8 mm. long, 5 mm. broad.

Cephalothorax yellowish-green, convex, hairy. *Caput* high, strongly arched, truncated in front, clothed with long coarse hoary hairs. *Clypeus* convex, broad, indented at the centre, clothed with long coarse hoary hairs. *Marginal band* broad, fringed with long coarse hoary hairs.

Eyes black; those of the central group equal in size, mounted on a dark brown tubercle, and forming a trapezium; the pair comprising the front row separated from each other by a space equal to twice their individual diameter, those of the second row by about one diameter, and the two rows from each other by about two diameters; lateral eyes minute, seated obliquely on small yellowish tubercles, but not contiguous.

Legs rather short, strong, with yellowish and dark brown annulations, thickly clothed with long hoary hairs, and armed with long black spines; relative lengths 1, 2, 4, 3.

Palpi short, strong, similar in colour and armature to legs.

Falces long, strong, glabrous, divergent at apex; the upper margin of the furrow of each falx armed with a row of four teeth, and the lower with a row of three; fangs dark brown at base, wine-red at points.

Maxillæ strong, broad, arched, glossy; laterally, towards base, obscurely coloured; apices and inner margins yellowish.

Labium conical, broader than high, obscurely coloured at base, yellowish at apex.

Sternum cordate, convex, glossy, dark brown with a median longitudinal bar of yellow, becoming very slightly broader from near the centre, and continuing gradually so to posterior extremity; the surface moderately clothed with shortish hoary hairs.

Abdomen ovate, convex, boldly projecting over base of cephalothorax, slightly indented at posterior extremity, the superior surface and sides clothed with short yellowish pubescence; seated laterally, towards anterior extremity, there are two small tubercle-like eminences; colours yellow, with two lateral anterior patches of darkish yellow-grey; the superior surface ornamented with a delicate tracery of wavy lines, commencing well forward and terminating at posterior extremity; in addition to these there is a series of ten punctures which, with the exception of the anterior pair, are distributed in transverse rows of two each, and of these the central pair are the largest and most prominent; the punctures dark brown within; sides yellow above, dark brown markings below; inferior surface yellowish-grey between epigyne and spinnerets; the latter are dark brown with an irregular patch of sooty black.

Epigyne a dark brown, arched, moderately high protuberance, having the appearance of a thick overhanging lip when viewed from above.

Hab.—Guildford.

Obs.—This species is somewhat variable, both in regard to size, colouration, ornamentation, and convexity. Some individuals are slightly darker than others, while the ornamental tracery is also much more prominent.

EPEIRA VARIABILIS, sp. nov.

(Plate XVII., figs. 3, 3a, 3b.)

♀. Cephalothorax 5 mm. long, 4 mm. broad; abdomen 10 mm. long, 6 mm. broad.

Cephalothorax yellowish, hairy, convex. *Caput* arched, truncated in front, glossy, clothed with long hoary hairs. *Clypeus* yellowish, with curved lateral dark brown bands, convex, clothed with long hoary hairs; median depression deep, lateral radial grooves indistinct. *Marginal band* broad, fringed with short hoary hairs.

Eyes black; central group form a trapezium, and are elevated on a moderately high tubercle; of these the front pair are slightly the smallest; lateral eyes minute, placed obliquely on small tubercles and contiguous.

Legs long, strong, reddish-brown with dark brown annulations, clothed with dark brown hairs, and armed with moderately long black spines.

Palpi short, yellow, similar in clothing and armature to legs.

Falces glossy, concolorous, divergent at apex; each margin of the furrow of each falx armed with a row of three teeth.

Maxillæ glossy, dark brown, pale yellowish laterally.

Labium short, broad, arched, dark brown.

Sternum concolorous, glossy, shield-shaped, convex, uneven, moderately clothed with short hoary pubescence.

Abdomen oblong-ovate, convex, strongly projecting over base of cephalothorax; superior surface cream-coloured, and ornamented with median and lateral dark and reddish-brown markings and a few minute red spots; sides—upper portion dark brown, mottled with red and cream-coloured patches and spots, lower portion yellowish-grey; inferior surface yellowish-grey with a long broad longitudinal patch of dark brown, the margins of which are

waved; in addition to this, the patch is bordered in front and laterally with a narrow waved band of yellow, and there are also six faintly discernible yellow spots in the median line seated in pairs, commencing in front and terminating towards the centre, and two minute lateral ones near the spinnerets; of this series the first pair are sensibly the largest.

Epigyne a dark brown lobe, with a long flagellate process commencing in front at its base, and directed backwards.

Hab.—New England and Bungendore.

Obs.—This species is widely distributed. Mr. A. M. Lea collected it both in the New England district and at Bungendore. I have also received a number of specimens from Gisborne, Victoria, where it was collected by Mr. George Lyall, Junr. Comparing the specimens collected by Mr. Lea, and again those collected by Mr. Lyall, the species appears to be exceedingly variable both in intensity of colouration and size. Those from Gisborne are somewhat larger than the New South Wales varieties, and much more brightly coloured. In so far as the specimens obtained in this colony are concerned, there is also considerable variation in colour and size.

EPEIRA SYLVICOLA, sp. nov.

(Plate XVII., figs. 4, 4a.)

♀. Cephalothorax 4 mm. long, 3 mm. broad; abdomen 7 mm. long, 5 mm. broad.

Cephalothorax reddish-brown, glossy, convex. *Caput* high, strongly arched, truncated in front, furnished with a few exceedingly short and fine white hairs at the base, sides and ocular area, the summit glabrous. *Clypeus* broad, convex, lateral indentations somewhat indistinct; a deep indentation seated at the middle; colour reddish-brown, becoming somewhat lighter at posterior extremity. *Marginal band* broad, yellowish-brown.

Eyes glossy black; the four comprising the central group seated upon a moderately high dark brown tubercular eminence, forming a trapezium; of these the two front eyes are somewhat the largest, and are separated from each other by a space equal

to fully twice their individual diameter, and those of the second row by about one-and-a-half diameters; the two rows separated from each by about two diameters; side eyes minute, contiguous, and seated obliquely on small dark brown tubercles.

Legs moderately long and strong, reddish-brown, lightly clothed with short, fine, black hairs, and armed with a few short black spines; *tarsi* black; relative lengths 1, 2, 4, 3.

Palpi. short, similar in colour and armature to legs.

Falces reddish-brown at base, becoming darker towards extremities, glossy, divergent; inner margins fringed with a few short, fine, white hairs; the margins of the furrow of each falx armed with a row of four teeth.

Maxillæ short, strongly arched, widely divergent, the apices inclining inwards.

Labium short, broad, arched, reddish-brown at base, pale yellow at apex.

Sternum shield-shaped, convex, dark brown, sparingly clothed with short white hairs.

Abdomen oval, arched, strongly projecting over base of cephalothorax; colours—at anterior extremity there is a black transverse patch, strongly cleft at the centre; thence light grey towards the middle, from whence it becomes suddenly dark grey; sides light grey; inferior surface obscurely coloured.

Epigyne a reddish-brown eminence curved posteriorly, indented in front, and lobed laterally.

Hab.—Guildford.

Obs.—This species is rather common in the County of Cumberland. I have taken it in the Illawarra district, and at Guildford, Fairfield and Liverpool.

Subfamily ARGIOPINÆ.

Genus ARGIOPE, Sav. et Aud.

ARGIOPE EXTENSA, sp. nov.

(Plate xvii., figs. 5, 5a, 5b, 5c.)

♀. Cephalothorax 3 mm. long, 2 mm. broad; abdomen 8 mm. long, 4 mm. broad.

Cephalothorax yellowish with dark brown lateral markings. *Caput* elevated, arched, truncated in front, normal grooves distinct; colour yellowish with fine silvery pubescence; there is also a dark Y-like mark commencing just below the ocular area and terminating at the base of the cephalic segment. *Clypeus* moderately convex, yellowish, with dark lateral markings, and clothed with fine silvery pubescence; there is a deep transverse curved indentation at centre; lateral radial grooves fairly distinct. *Marginal band* narrow, yellow, fringed with short hoary hairs.

Eyes glossy black; of the four comprising the central group, the two constituting the front row are separated from each other by a space equal to about twice their individual diameter, and by rather more than that space from those of the second row; these latter somewhat the largest of this series, and separated from each other by about twice their individual diameter; lateral pairs minute, seated obliquely upon tubercles and nearly contiguous.

Legs long, slender, yellowish, with dark brown annulations, clothed with fine short hairs, and armed with rather long black spines; relative lengths 1, 2, 4, 3; the first pair are the longest, the second and fourth somewhat shorter and co-equal.

Palpi short, pale yellowish, clothed with short yellowish hairs, and armed with rather long black spines.

Falces long, strong, outer margins obscure yellowish, inner margins pale yellow.

Maxillæ: outer margins dark brown, inner, pale yellow.

Labium dark brown at base, pale yellow from near centre to apex.

Sternum shield-shaped, arched, surface uneven, dark brown laterally, with a yellow longitudinal sinuous median patch.

Abdomen oblong, moderately projecting over base of cephalothorax, arched; superior surface pale yellowish, deepening to tawny at posterior extremity; a longitudinal, uneven, and broken dark brown bar runs down the centre; at the posterior extremity there are also two short uneven lateral bars; in addition to these there is a series of ten deep lateral dark brown spots or punctures arranged in pairs, commencing near anterior, and terminating

near posterior extremity; lateral ornamentation a broad sinuous dark brown band, beneath which there are alternate wavy striations of white, dark brown and tawny; superior surface and sides clothed with silvery pubescence; inferior surface dark brown with white lateral bars.

Epigyne a broad, strongly arched process, dark brown above, yellowish laterally.

Hab.—Guildford.

ARGIOPE PALLIDA, sp. nov.

(Plate xvii., figs. 6, 6a, 6b.)

♀. Cephalothorax 4 mm. long, 3 mm. broad; abdomen 9 mm. long, 6 mm. broad.

Cephalothorax glabrous, yellowish, with dark brown markings. *Caput* high, arched. *Clypeus* arched, deeply indented at centre. *Marginal band* narrow.

Eyes black; the four comprising the central group elevated upon a tubercle; those of the front row slightly the smallest of this series, separated from each other by a space equal to once their individual diameter; the second row of eyes separated from the first by twice their diameter, and from each other by once their individual diameter; lateral eyes minute, the lower ones exceedingly so; these latter seated obliquely on small tubercles, in a line with the front pair of eyes of the median group.

Legs long, tapering, pale yellow, armed with short black spines; relative lengths 1, 2, 4, 3.

Palpi short, similar in colour and armature to legs.

Falces yellow, glabrous; the upper margin of the furrow of each falx armed with a row of three teeth, and the lower with a row of two.

Maxillæ concolorous, short, equally as broad as long, convex.

Labium concolorous also, subtriangular.

Sternum shield-shaped, tuberculate, dark brown laterally, yellow in the median line.

Abdomen oblong, convex, moderately projecting over base of cephalothorax; superior surface glossy white, with a few black spots, and ornamented at posterior extremity with four yellow-brown stripes; the latter are pointed in front, retreat gradually, and unite at ultimate extremity; sides white above, yellow-brown below; inferior surface yellow-brown.

Epigyne an arched and somewhat conical protuberance, directed towards spinnerets.

Hab.—Queanbeyan.

ARGIOPE GRACILIS, sp. nov.

(Plate xvii., fig. 7.)

♀. Cephalothorax $3\frac{1}{2}$ mm. long, 2 mm. broad; abdomen 8 mm. long, 4 mm. broad.

Cephalothorax yellow-brown, glabrous above, fringed in front and laterally with short hoary pubescence. *Caput* moderately high, arched. *Clypeus* convex, arched, deeply indented at centre, radial grooves moderately distinct. *Marginal band* narrow.

Eyes as in *A. pallida*.

Legs long, tapering, yellow-brown, armed with short black spines; relative lengths 1, 2, 4, 3.

Palpi short, yellow, similar in colour and armature to legs.

Falces as in *A. pallida*.

Maxillæ yellow, inner margins dark brown; equally as broad as long, convex.

Labium yellow, subtriangular.

Sternum shield-shaped, tuberculate; yellow-brown laterally, pale yellow in the median line.

Abdomen oblong-ovate, moderately projecting over base of cephalothorax; superior surface glossy white, ornamented with a delicate tracery of fine yellow lines commencing at its anterior extremity with a single median line, and terminating at the posterior extremity with a net-work design; there are also two small punctures at the centre; sides and inferior surface dark brown.

Epigyne an arched and somewhat conical protuberance directed towards spinnerets.

Hab.—Bungendore.

Subfamily GASTERACANTHIDE.

Genus DICROSTICHUS, Simon.

DICROSTICHUS MAGNIFICUS, sp. nov.

(Plate XVII., figs. 8, 8a, 8b.)

♀. Cephalothorax 6 mm. long, 7 mm. broad; abdomen 13 mm. long, 16 mm. broad.

Cephalothorax pale yellowish, tuberculate, truncated in front, broader than long. *Caput* clothed with short yellowish pubescence, elevated, tuberculate, the tubercles yellow, with the exception of the one carrying the four central eyes, which is black at the summit, reddish-brown at back and sides, and yellow in the front. *Clypeus* broad, convex, tuberculate, reddish-brown at the middle, yellowish laterally, and clothed with short pale yellowish pubescence; tubercles thirteen in number, of these the highest and most prominent is the one constituting the central ocular eminence.

Eyes reddish-brown; the four intermediate eyes are seated towards the summit of a large and prominent median club-shaped tubercle; of these the lower pair are the largest; lateral eyes seated in pairs at the extremity of an arm-like tubercular protuberance extending from the base of the median tubercular eminence; these latter are minute and not contiguous.

Legs strong, moderately long, pale yellowish, with yellow-brown annulations, and clothed with short yellowish pubescence; relative lengths 1, 2, 4, 3.

Palpi short, strong, similar in colour to the legs.

Falces yellowish, long, strong, clothed with short coarse yellowish hair.

Maxillae obscurely coloured, club-shaped, inclining inwards, broadest at apex.

Labium concolorous, short, broad, wedge-shaped.

Sternum yellowish, hairy, shield-shaped, tuberculate.

Abdomen cordate, broader than long, overhanging base of cephalothorax, convex; there are two large yellow lateral tubercles, seated rather lower than midway between anterior and posterior extremities; besides these there is a group of seven small tubercles at the posterior extremity, distributed over three rows, the first of which consists of two, separated by a space equal to about four times their individual diameter; the second row contains three, is curved, the curvature directed forwards, and each of this series is separated from its neighbour by about three times its individual diameter; the anterior extremity is ornamented by a series of eight rather large yellow patches, and six smaller ones; from near the centre to posterior extremity there is a series of rather sharply defined punctures; laterally and underneath the colour is yellowish-grey.

Epigyne a long transverse slit.

Hab.—Mount Kembla.

Obs.—This interesting specimen was taken by Mr. A. G. Hamilton, to whom I am indebted for the privilege of describing it. A full description of its nidification and cocoons will be found in another portion of this paper.

Family DRASSIDÆ.

Genus CHEIRACANTHIUM, C. Koch.

CHEIRACANTHIUM SILACEUM, sp. nov.

(Plate XVIII., figs. 1, 1a.)

♀. Cephalothorax 4 mm. long, 3 mm. broad; abdomen $5\frac{1}{2}$ mm. long, 3 mm. broad.

Cephalothorax yellowish-brown, glossy, moderately clothed with short hoary hairs. *Caput* high, strongly arched, normal grooves moderately distinct. *Clypeus* convex, with a moderately distinct depression at the centre at junction of cephalic and thoracic segments. *Marginal band* narrow.

Eyes of an opaline tint with black rings, and distributed over two moderately curved rows; the lateral pairs are somewhat the smallest, are placed obliquely, and are nearly contiguous; the median pair of the front row are sensibly the largest of the group, and are separated from their lateral neighbours by a space equal to fully twice their individual diameter, and from each other by about one diameter; the median pair of the second row are separated from the lateral eyes by rather more than twice their individual diameter, and from each other by a space equal to fully three diameters.

Legs moderately long and tapering, sparingly clothed with yellowish pubescence; the trochanters and femora straw-coloured, tibiae and metatarsi yellow-brown, tarsi black; relative lengths 1, 2, 4, 3.

Palpi moderately long, glossy, tips black.

Falces yellowish in front, yellow-brown underneath, long, strong, glossy, slightly divergent at tips, where they are dark brown; outer margins sparingly furnished with yellowish pubescence, the inner margins thickly clothed with long stiff yellowish hairs or bristles; each margin of the furrow of each falx armed with a row of three teeth; *fangs* long, dark brown at base, wine-red at tips.

Maxillae long, glossy, club-shaped, yellow-brown, darker at apex.

Labium long, conical, yellow-brown at base, dark brown at apex.

Sternum shield-shaped, convex, yellow, clothed with moderately long hoary hairs.

Abdomen ovate, convex, slightly projecting over base of cephalothorax, pale yellowish; the superior surface ornamented in the median line with a faintly discernible longitudinal bar, from which extends a series of slightly curved branches; the bar indicated commences near anterior extremity, and is rather more than two-thirds of the length of the abdomen; the superior and inferior surfaces and sides are clothed with moderately long but

fine hoary hairs, with a few long coarse dark brown hairs or bristles interspersd.

Epigyne slightly elevated, dark brown.

Hab.—Guildford.

Family SALTICIDÆ.

Subfamily ATTIDÆ.

Genus ATTUS, Simon.

ATTUS FLAVICRURIS, sp. nov.

(Plate XVIII., fig. 2.)

♀. Cephalothorax $2\frac{1}{2}$ mm. long, 2 mm. broad; abdomen $3\frac{1}{2}$ mm. long, $2\frac{1}{2}$ mm. broad.

Cephalothorax yellow-brown, fringed in front with rather long white hairs. *Caput* between the eyes yellow-brown, and furnished with a few short hoary scale-like hairs, lateral ocular area jet black; sides yellow-brown, fringed with short scale-like hoary hairs. *Clypeus* yellow-brown, retreating; the junction of cephalic and thoracic segments indicated by a somewhat shallow depression.

Eyes black, almost forming a square; the front lateral eyes placed rather lower down than the posterior ones; central eyes, which are the smallest of the group, seated slightly within a straight line drawn through their front and near lateral neighbours; front median eyes the largest of the group.

Legs pale yellow, moderately long and strong, armed with somewhat darker, long and strong spines, and clothed with fine yellowish hairs; relative lengths 1, 2, 4, 3.

Palpi short, similar in colour and armature to legs.

Falces short, reddish-brown, conical, placed far back behind the frontal margin.

Maxillæ yellowish-brown, somewhat darker at base, club-shaped; inner margins towards apex thickly fringed with yellowish hairs; there are also a few rather long concolorous hairs distributed over their outer and lateral surfaces.

Labium concolorous, rather long, conical, arched, and furnished with a few rather long coarse hairs.

Sternum yellowish, shield-shaped, convex, lateral edges fringed with rather long yellowish hairs, the surface moderately clothed with short yellowish pubescence.

Abdomen ovate, moderately projecting over base of cephalothorax, dun-coloured; the superior surface ornamented with two broken longitudinal lines of a somewhat darker colour; these commence well forward and terminate near posterior extremity, below which there are again two strongly curved concolorous transverse bars, the curvature directed backwards.

Epigyne a dark somewhat circular protuberance, uneven in outline, and hollow within.

Hab.—Guildford.

In pursuing the study of the architecture of the Araneidæ, the student cannot fail to be struck by the poverty of the literature on the subject. In so far as Australia is concerned, practically nothing has been done, and yet the wealth of material at hand is so vast, that the wonder is it should have remained so long neglected. Singularly enough what is true of Australia is equally so in regard to other countries. To be sure, some authors, such as McCook*, Wagnert†, and Cambridge‡ have given the matter great attention, but the majority of writers seem content with merely describing species, and publishing on rare occasions a few fragmentary notes, while others draw their conclusions from observations on the work performed by spiders when in captivity. In many instances these are misleading, because a captive often constructs an edifice entirely different from the one invariably met with in its natural haunts. Nevertheless it will be readily conceded that much valuable knowledge may be gained by intelligently noting the habits of these creatures when in a state of captivity, and comparing the observations with those acquired in

* American Spiders and their Spinning Work; also various papers in the Volumes of Proceedings of the Acad. of Nat. Sciences, Philadelphia.

† L'Industrie des Araneina. Mém. de l'Acad. Imp. des Sci. de St. Pétersbourg. vii^e Série, Tome xlii. No. 11, 1894.

‡ Spiders of Dorset.

the field. *Gasteracantha bispinosa*, Keys., is a case in point. This spider in its natural haunts constructs an orbicular snare, but in captivity the fabric consists of a number of lines thrown seemingly at random. Two specimens kept by me at different times, although provided with ample room, and placed in a suitable position for light, constructed webs of a nondescript design, but upon being liberated in my garden, resorted to their customary form of architecture. Again, the snare of *Agelina labyrinthica*, Walck., is very different in confinement from the one it fabricates in its natural sphere. Spiders of this genus are very common in the County of Cumberland. They are found in scrub lands, and on a variety of soils, being common on sandy hills around Sydney, and again in the heavier loamy districts at Guildford and Fairfield. The snare of *Agelina* is constructed under the cover of some bush or shrub, close to the ground, the upright stems of weeds, grasses, or other convenient projections being used for the purpose of supports. The snare itself is a veritable labyrinth. From the main body of the web a tunnel is constructed, running into the ground in an oblique direction. In this the spider rests, until apprised, by the vibration of the mesh, of the capture of some unwary insect, whereupon it rushes out, and having secured its prey, carries it into the silk-lined burrow, there to devour in peace its unhappy victim. In captivity, the snare is not nearly so complex, as I have proved by keeping specimens at various times. For the purpose of observation I placed one of these spiders in a box about a foot long, nine inches broad, and eighteen inches deep, having previously put sufficient soil to cover the bottom to the depth of four inches. At first the creature was somewhat shy, but at length it picked up sufficient courage to survey the extent and surroundings of its prison. Having satisfied its curiosity, it betook itself to one of the corners of the box, and remained perfectly quiet, evidently quite undesirous of being watched. Noting this, I left it to itself for a while, and upon visiting it again, found that it had stretched several lines of silk the length of the box, and about midway between the soil and the lid. After this a number of other lines were drawn from

different positions along the sides of the box, but all converging to one point, which afterwards proved to be over the site selected for its subterranean gallery. Having progressed so far, it now turned its attention to the formation of the tunnel that was to connect the gallery with that part of the web intended to be used for ensnaring its prey. Upon the construction of this important adjunct, she bestowed a great deal of time and labour, but although commencing it before excavating the burrow, the little worker did not attempt to complete it until she had finished her digging operations. As she proceeded with the excavation she spun line after line of silk, both around, and up and down to prevent the sides falling in, which would inevitably have resulted on account of the loose and free nature of the material upon which she was working. The excavation having at length been completed, she set to work to finish the tunnel and the snare, stretching lines the length of the box, interlacing them with other threads from every conceivable point and angle, until at length she had produced a network of beautiful fine silk, but of an exceedingly irregular design. The fabric of the tunnel was of a much closer texture than that of the body of the web. The snare itself took the form of a somewhat flattened sheet, but had a marked depression towards the mouth of the tunnel; nevertheless the structure was entirely devoid of the labyrinthine lines peculiar to the snare as seen in the bush. Wagner, in commenting upon similar observations and experiments recorded by Rossi and Lister, remarks:—"This is comprehensible: the architect in captivity lacks the material that it employs in a state of liberty; besides this the spot for building is not that chosen by herself, but one given by the observer; yet most frequently the descriptions of nests relate to those formed in captivity, and the constructions built under these conditions are accepted as normal."*

From the foregoing notes it will be seen how exceedingly unwise it is to draw conclusions solely from observations made on animals

* *L'Industrie des Araneina*. Mém. de l'Acad. Imp. des Sci. de St. Pétersbourg. vii Série. Tome xlii. No. 11, p. 4.

kept in captivity. At the best they can but form a clue to their life-histories, although at times they may be useful in assisting to elucidate problems encountered in the field. Upon this question I am fully in accord with Wagner, when he says :—"Such descriptions are prone to great error, because certain spiders which, in liberty place their cocoons on the *outside* of their snares, in captivity, and with new surroundings, often change the position; thus a species which habitually establishes its cocoon at a distance from its snare will, in captivity, place it either above or at the side. This is not the result of new conditions, but simply the impossibility to do otherwise owing to its environment; nevertheless such incidents are often taken as normal phenomena."*

In applying myself to the study of the architecture of Australian Araneidæ—so far as the present paper is concerned—I propose to deal first with the *Epeiridæ*, secondly with the *Drassidæ*, thirdly with the *Salticidæ*, and fourthly with the *Thomisidæ*, and to note in illustration of the spinning-work of these creatures such examples as have come under my own observation.

EPEIRIDÆ.

The spiders of this family, owing to their habits and modes of life, are undoubtedly one of the most prominent groups in the whole of the *Araneidæ*. To the casual observer they are familiar by their orb-like snares which are always located in more or less exposed positions. The mode of weaving the typical snare has been so often and so fully described that it would be superfluous and wearisome here to enter into minute details. Indeed, considering how common and prominent they are, it would be strange if they had not at an early period attracted notice. At the same time, it must be borne in mind that the habit of fabricating orbital snares is not absolutely constant in the *Epeiridæ*. Cambridge has drawn attention to a species of this extensive family that does not do so. In reviewing Thorell's great work† the eminent

* *Loc. cit.* pp. 4, 5.

† Remarks on the Synonyms of European Spiders. Upsala, 1869-70.

English arachnologist says* :—"Dr. Thorell was necessarily unacquainted with an undoubted Epeirid (a native of New Zealand, and as yet undescribed), observed and beautifully figured by Dr. Llewellyn Powell, belonging to the genus *Arachnura*, Vinson. This spins only a few irregular threads, crossing each other at various places, among twigs or small branches and stems of herbaceous plants, very similar to some spiders of the genus *Theridion*, family *Theridioides*."

Often when wandering along country roads the eye of the traveller lights upon some huge web, the outer lines or guys of which are frequently from 30 to 40 feet in length, and occasionally even more. Sometimes these lines are stretched from tree to tree, across roads over which there is constant vehicular traffic, and at other times bridging streams. On one occasion I saw a web, the main line of which was thrown athwart the South Head Road, near Belle Vue Hill, the objects to which the ends were attached being a tree on one side and a telegraph post on the other. By a well-directed stone I succeeded in bringing the builder down. It proved to be *Epeira herione*, L. Koch. It is remarkable, considering how fragile these structures are, the amount of wind pressure they can bear—a fact that can only be explained by their elasticity. The time when orb-weavers are most active is after sunset. It is then that they fabricate their orbitular snares. Usually from half-an-hour to forty minutes is sufficient to complete the work. The long bridge-lines, so far as my observations have gone, and I have noted a good many, have always been wind-borne, and, moreover, their length is affected by this agency, that is to say, a spider when setting out upon the task of constructing a web can have no choice in the selection of a suitable attachment opposite to the one from which it emits its thread. The line thrown out is carried by the air-current, and continues to float until the free end strikes some object to which it adheres. There may be other equally suitable objects nearer than the one to which it finally attaches, but they escape for the

* Ann. Mag. Nat. Hist., Vol. vi., 4th Series, 1870, p. 116.

simple reason that they are not to leeward of the spider and the prevailing air-current. In his work on "The Spiders of Dorset," Cambridge says:—"Spider lines may frequently be observed strained across open spaces of many feet and even yards in extent. This has been explained by some naturalists to have been done by the help of a current of air carrying the thread across. I cannot, of course, say that it has never been thus effected; though I have certainly never myself witnessed it. I have, however, on several occasions seen a spider fix its line, then run down to the ground, across the intervening space, and so up the opposite side, trailing its line as it went, and then, having hauled in the slack, it fixed the line to the desired spot. This I believe to be the usual mode of proceedings in such cases"* In addition to this, it is only fair to say that in the second volume of his work, and after further investigation, the distinguished author modified the expression of opinion just quoted.

The webs of spiders of the genus *Gasteracantha* are always placed low down, sometimes only two feet from the ground, and are of varying lengths. Some that I have measured were only three feet in length, and some even less, while others were fully six. These webs are generally found in rough, scrubby localities, in which the intervening spaces between the two points of attachment are such that it would be very unlikely indeed for the architect to be successful in any attempt to carry its thread from one point to another. One evening last summer I watched a spider (an Epeirid) that had located itself on one of the highest spurs of a rose bush. It threw out a line of silk, but owing to no suitable attachment being in line with it and the direction of the prevailing air-current, it failed to secure a connection. Nor was it content with one trial, but made repeated efforts to achieve its object. After the lapse of an hour I took the spider from the position it had selected and placed it on another shrub, opposite to which, and in a line with the air-current, another plant was standing, and although it made no attempt to repeat the efforts just narrated before I retired, I found upon visiting the spot next morning that it had succeeded in fabricating its snare.

* Spiders of Dorset, Vol. i., Introduction, p. xxi.

It will be conceded, therefore, from the facts here stated, that the bridge-lines of webs are influenced by the direction of air-currents. At the same time I am free to admit that in the case of webs constructed within a narrow space, and where the bridge-lines are short, spiders do sometimes carry the line to the opposite point of attachment.

In 1881 Dr. McCook, at the close of an interesting address delivered before the Academy of Natural Sciences, Philadelphia, said :—“ While this use of air-currents is certainly placed beyond doubt, it is as certainly not the only mode of laying foundation-lines, and is dependent very much upon the site chosen, the condition of the wind, the abundance of prey, etc. Webs built in large open spaces are perhaps always laid out by bridge-lines [*i e*, lines carried by air-currents.—W.J.R.]. In more contracted sites, the frame lines are generally carried around, and often a foundation is the result of both methods.”*

Some time ago it was my good fortune to discover what may certainly be considered an extraordinary web. This peculiar snare was stretched between three large shrubs, the situations of which described a triangle (. . .), and was what may be denominated, for want of a better term, a “double” web. The main body of the mesh consisted of the typical orb, with the customary outer lines or guys, but at the back, and running down the centre, the spider had placed a semi-orb. I spent a long time in looking for the interesting architect, but without success, and it is quite possible it may have fallen a prey to some insectivorous bird. Other orbitular snares are occasionally met with, having cords attached to the centre or “hub,” drawn taut, and firmly secured to a branch or trunk of a tree, thus causing the snare to be sharply depressed, the object being, doubtless, to strengthen it against the wind.

Snare-fabricating spiders form two great tribes: the *Orbitulariæ* and *Retitulariæ*; the webs of the former are more or less geometrical, orb-like, in most instances erected in a vertical position, though sometimes oblique, and in some instances hori-

* Proc. Acad. Nat. Sci. Philadelphia, 1881, p. 435.

zontal; those of the latter are festoons fabricated in corners or angles of buildings, and among the small branches of shrubs, or under the overhanging ledges of rocks, and consist of irregular lines extending from every conceivable point and angle, crossing and interlacing each other. Amongst our endemic *Epeiridæ* there are some species that construct composite webs—that is to say, in addition to an orb-like snare, there is a network of irregular or retitelarian lines, such, for example, as those described by me in connection with the web of *Epeira wagneri*, Rainb., in a former paper.* Whilst taking a ramble at Guildford last spring, I was so fortunate as to discover an exceedingly interesting web of the composite type, but very different to the one just referred to. This was the snare of *E. crassipes* (ante, p. 515). The orb-like mesh of this spider is always suspended horizontally, and the radii and concentric rings are exceedingly fine and closely woven. This portion is about 9 inches in circumference. The centre of the orb is looped up, giving it a somewhat tent-like appearance. Above the orb a cone-shaped nest or retreat is suspended, mouth downwards, and from the interior of this there are lines connecting it with the main body of the structure. The accompanying figure is a diagram of the upper portion of the web in profile.

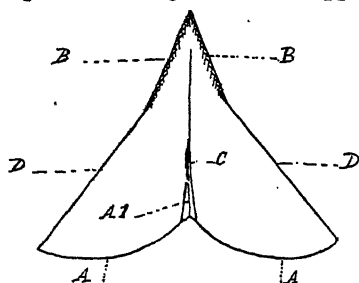


Fig. 1.

A represents the orb which is looped up at A1; B the nest or retreat; C the lines looping up the orb; and D the centre lines stretched from the lower portion of the nest to the edges of the orb. The nest is skilfully made. It is composed of colourless silk, among the threads of which

dead leaves of *Leptospermum* or ti-tree are woven, thus affording not only an admirable shelter from the weather, but also a protection from the raids of predatory

* P.L.S.N.S.W. 1896, Vol. xxi. pp. 335, 336; *E. sylvicola*, described in this paper, ante, p. 518, constructs a web and nest exactly like *E. wagneri*.

birds. In this secluded retreat the female dwells in company with her mate, until at length, getting tired of his company and attentions, the latter has to beat a retreat, or fall a victim to her rapacious appetite. Being now left in complete and undisturbed possession, the female immediately sets to work to increase the size of her dwelling, after which the egg-bags or cocoons are made and placed therein. These are usually four in number, spherical, and somewhat varying in size, and contain on an average about 200 eggs each; these are of a pale yellowish colour and exceedingly glutinous. The walls of the cocoons are somewhat loosely and thickly constructed, and are of a pale yellowish colour; attached to their loose threads are a number of minute, hard, silken pellets, some of which are white and some dark green. The cocoons are always suspended inside the nest, one under the other, the mother mounting guard until the young hatch out. In addition to the orbicular portion there is a perfect labyrinth of lines both above, below, and surrounding it. Enclosed also within these retitelarian lines, but seated below the orb, a "floor" or horizontal curtain of web is constructed, much like that of the snare of *E. basilica*, McCook.* *E. pallida* (ante, p. 514) fabricates a snare and nest like the one just described. The young of these spiders live together in communities during the first two or three months of their existence; each youthful Epeirid after undergoing the first moult, constructs its own snare, with retreat, orb, floor, and retitelarian lines complete, the outer lines or guys of each miniature web joining that of its neighbour's. So numerous are these young spiderlings that their united webs often completely envelope large shrubs. It will thus be seen that some orb-weavers unite with their beautiful and typical snares the principal features of the line-weavers' webs, thereby apparently forming, to quote McCook,† "a perfect link between the orb-weaving and line-

weaving spiders in the characteristic spinning-work of the two groups.”*

In a former paper† I described and figured the leaf-rolled nest of *Epeira wagneri*, Rainb. During the month of December, last year, I had the opportunity of studying the life-history of the young of this species, and noting their progressive development. The first specimen I examined, and which was somewhat the youngest of the new brood, the spiderling had constructed a silken cell on the spur of a branchlet of a ti-tree, the form and architecture being very similar to the nest of a Drassid; another (somewhat older) had selected the under surface of a leaf of a turpentine tree, across the centre of which it had spun a simple sheet of web; this nest was so constructed that its tenant could make an exit either at one end or the other, and was very primitive in design; a third individual took up its abode upon the upper surface of a leaf of the same tree, and had constructed its nest in much the same manner as the foregoing; a fourth had selected the underside of a small leaf of a turpentine tree that was suffering from the depredations of some insect pest, and from the effects of which it was curled and twisted out of its natural shape. This naturally formed a good shelter both from the weather and insectivorous birds. The nest consisted of a rather long silken tube, the entrance to which was towards the apex of the leaf. Other individuals, somewhat older, made their nests similar to those of the adult spiders, but always in proportion to their size. These they discard for larger habitations as they increase in bulk. One web that I examined had two of these leaf-nests, the smaller of which had evidently been very recently discarded for a larger tenement; the proof of this lay in the fact of the presence of the exuviae from a recent moult. All the leaf-nests described were

* *Loc. cit.* pp. 124-132. McCook describes at considerable length and illustrates with numerous figures the webs of several American spiders of the genera *Epeira* and *Linyphia*, the object of which is to trace an analogy between the spinning-work of the two groups (*q.v.*).

† P.L.S.N.S.W. 1896, pp. 335, 336, pl. xix. figs. 2a, 2b, 2c.

attached to webs typical of this species, and thus formed a good object lesson in their progressive architectural development.

Argiope extensa, Rainb., and *A. protensa*, L. Koch, construct their orbitular snares upon bushes, and are generally placed low down. The egg-bag or cocoon of each is spherical, and about the size of a pea. The eggs are green, and being only thinly enswathed with fine colourless silk, the cocoons appear upon a superficial examination to be of a light or pea-green colour. *A. regalis*, L. Koch, is a very common spider in the County of Cumberland, although its range is by no means restricted within that area. In the centre of its snare there is always a large X-like cross, the lines of which are zig-zagged. These being broad and white form a striking contrast to the fine, colourless lines of the orb. When reposing in the centre of the mesh, the animal spreads out its legs so as to describe an X, each pair being placed closely together. The males are veritable pigmies in comparison with the females, though in proportion to their size the legs of the former are considerably longer. When pairing the sexes inhabit the same web, the female occupying the centre as usual, and the male the upper edge. The endeavour to ingratiate himself with the object of his choice is not without the element of danger, and even when he succeeds in so doing he seldom escapes scatheless. Before leaving his post he always tries the tension of the web with his feet, after which he runs down nimbly and lightly, so as not to attract her attention, climbs on her back and remains for a time in that position. Should she not succeed in dislodging him, he next



Fig. 2.

endeavours to climb down to the underside of her abdomen, where having attached himself in the necessary position, and with

his legs firmly grasping her abdomen, the act of copulation is performed, after which he has to be very active in dropping out of the web, and placing himself beyond her reach, or else he will pay the penalty with his life.

Although of the tribe *Orbitulæ*, *Dicrostichus magnificus* (*ante*, p. 523) does not fabricate an orbital snare. The web of this species is of a distinctly retitelarian character. The nest is composed of a number of dead leaves (Fig. 2), and were it not for the silken threads with which they are bound together, would put one in mind of a miniature bird's nest rather than that of a spider's. The tube or retreat is long, lined with silk, and very cleverly constructed.* Attached sometimes to leaves connected with the nest,

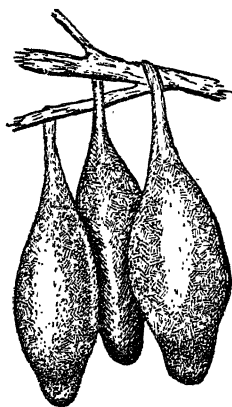


Fig. 3.

and sometimes to adjacent objects, sticks, &c., are the egg-bags or cocoons (Fig. 3). These vary in number: usually there are three, but occasionally five. The cocoons are of a pale yellowish or straw-colour, about $3\frac{1}{4}$ inches long and $2\frac{1}{2}$ inches in girth at their widest part. Each cocoon has a narrow neck about three-quarters of an inch in length, after which it bulges out strongly until the maximum width is attained; from thence it gradually tapers off, terminating finally with a blunt, rounded point. The walls of the cocoons are exceedingly closely woven, smooth, and tough; within they are sparingly lined with loose, colourless silk. Surrounding the nest there is a numerous array of retitelarian lines, crossing and interlacing each other from every possible angle. The whole structure is exceedingly complicated, and, so far as the web is concerned, there is no attempt whatever at design. The denser portion of the mesh is placed at the side, and as near as possible on a line with the nest. Often when rambling through

* I am indebted to my colleague, Mr. Edgar R. Waite, for the excellent drawing of the nest of this spider.—W.J.R.

the bush in quest of specimens, and for purposes of observation, I have noticed these cocoons, but was never successful in obtaining a specimen of the architect responsible for the structure. I have also, at various times, had specimens of these cocoons sent me for determination, but always without the spider. It is to Mr. A. G. Hamilton, of Mount Kembla, that I am indebted for the specimen described in this paper, and also for a photograph of the creature, with its nest, and cocoons *in situ*.

Speaking generally, the Epeiridæ do not all construct tube-nests or retreats. Among those that do so, *Epeira wagneri* and *E. sylvicola* are never seen resting at the centre or "hub," as is the usual custom with orb-weavers; on the contrary, they are always to be found within their rolled-leaf nests. Whenever an insect becomes entrapped within the mesh, these spiders immediately rush out and enswathe the struggling victim in the usual manner of the Epeiridæ. Among other groups, as the Drassidæ and Attidæ, for example, a tube or nest is made for the purpose of taking shelter during the period of moulting, as will be explained in another part of this paper, but with the Epeiridæ this is not so. When the time arrives for an Epeirid to cast its skin, it quietly settles down wherever it may be to undergo the process, which is proved by the positions in which exuviae are frequently found.

DRASSIDÆ.

Among the species described in the present paper one is referable to the family Drassidæ, i.e., *Cheiracanthium silaceum*. The spiders of this family reside in silken cells which they construct in the crevices of rocks and walls, amongst leaves, under stones, and the exfoliating bark of trees, and capture their prey either by surprise or pursuit. They are generally of small size, of neat and compact form, and exceedingly active. The cocoon of *C. silaceum* is placed within the cell or nest, and consists of two white plaques, between which the eggs are placed. The nest itself is about the size of a walnut, its bulk being caused by the little architect weaving dead Leptospermum leaves among the silken

filaments, thereby affording absolute immunity from the attacks of insectivorous birds; but it must be understood that the leaves are only introduced into those structures that contain cocoons, the nests occupied when moulting consisting only of the usual white silk, and being free from foreign substances. During the periods of moulting or maternity, the entrance to the nest is always securely closed. Nothing can exceed the maternal care, devotion and self-abnegation of *C. silaceum*, for not only does the mother mount guard over her eggs, but absolutely refrains from leaving them even for a moment, and abstaining entirely from food, not only until after they have hatched out, but until they have become old enough and strong enough to quit the nest and start in life for themselves. The retreat—nest—is constructed at the spurs of shrubs, is white and open at each end, and serves as a shelter from the weather, or for repose and for protection from enemies.

The spiders of the genus *Clubiona*, Walck., have been classified by most authors (Walckenaer, Westring, Ohlert, Staveley, Simon, Thorell, Dahl, and others) with the *Drassidæ* but Wagner (in a paper which I have not yet seen*) has allotted it to a separate family, *Clubionidæ*, of which it is the sole representative. In so far as the architecture of the species is concerned, there is much in common with other representatives of the *Drassidæ*. The spiders conceal themselves in silken cells which they construct either on or among the leaves of plants, in the crevices of walls or rocks, under stones, among the rugulosities of trees, and behind exfoliating bark. In the capture of their prey, which they take either by surprise or pursuit, they display great activity. In connection with the question of their architecture, it is only right here to explain that it consists of three distinct types: (first) the *retreat*, consisting of a silken tube with two apertures, in which the spider dwells during those periods when she is not moulting,

* "Observ. s. l. Araignées," Bull. de la Soc. des Naturalistes de St. Pétersbourg, 1880; see also "L'Industrie des Araneina," Mém. de l'Acad. Imp. des Sci. de St. Pétersbourg, vii^e Série, Tome xlii. No. 11, 1894.

and when she is free from maternal cares; (second) the *nest* wherein the animal moults, or in which the cocoon is established; and (third) the cocoon containing the eggs.

In the construction of the retreat varying degrees of perfection are displayed, and these are influenced by circumstances, such as the length of time a spider occupies a nest, for it not infrequently happens that after establishing a home in one locality it will reject it for another, probably out of consideration for its larder, the position taken up in the first instance not being sufficiently productive; again, another reason for changing may arise from exposure to disturbance or attack. It may, therefore, be laid down as a law that the higher or lower the degree of perfection attained is due entirely to the length or brevity of the spider's sojourn in the retreat. This fact has been recorded by Wagner,* who, in explanation, observes that "the shorter its sojourn, the simpler the structure of the retreat; the longer the sojourn of the animal the greater is the quantity of silk used, and the more careful the workmanship in the construction of the retreat" [plus il est court—plus simple est la structure de la retraite, et inversement: plus longtemps y reste l'animal—plus grande est la quantité de fils, qui s'accumulent, et plus soigneusement se fait la retraite.] When the retreat is constructed on the spur of a shrub, such as the ti-tree or *Leptospermum*, as in the case of *Clubiona modesta*, Koch, it is secured by threads to the stem and its leaves, but when on the other hand a broad leaf is selected, the spider takes up its position on the reverse side and draws the edges over, binding them in position by a series of threads. In describing the retreat of *C. pallidula*, Clerck, Wagner has given a series of figures† elucidating the manner in which the edges of the leaf are brought together, and as the *modus operandi* is the same throughout the species, they may be briefly explained. The first figure (fig. 161 on the author's plate) represents a transverse section of

* *Loc. cit.* p. 119.

† *Loc. cit.*, pp. 119-122, Pl. II. figs. 161-164.

the leaf with the first series of threads stretched from edge to edge, so as to describe the arc of a circle; the second (fig. 162) represents the leaf still further warped over by the second series of threads, so that it now forms a semicircle; the third figure (fig. 163) illustrates the result of the third series, the circling of the leaf being nearly complete; and the fourth (fig. 164) the leaf completely circled. The first series of threads are irregular, and apparently carelessly drawn, but as the work proceeds towards completion greater attention and care are displayed. It is not until after the completion of the third stage in the circling of the leaf that any attention is bestowed upon the interior of the tube. Up to this time the spider has confined her attention and energies solely to attaching silk to the edges of the leaf, but now she commences the work of fabricating the internal tapestry and lining the walls of her retreat, putting in the final touches after the edges have been brought together. It sometimes happens that in the neighbourhood of the leaf selected there is a second, and occasionally a third leaf. In such circumstances the spider, working purely upon instinct, incorporates them in the tube. This is illustrated by the retreat of *Drassus perelegans*, described and figured by me in a former paper.* Again, to quote Wagner,† if during the task of warping a leaf the spider is prevented from bringing the edges closely together by the observer placing a small stick between them, she is not at all disconcerted, but proceeds immediately to enclose the aperture with a wall of silk, by passing her abdomen from side to side over the spot. Again, if the stick be removed, the edges of the leaf will soon unite without any effort on the part of the worker, owing to the contraction of the silk [rien qu' à cause de cette élasticité de la soie elle-même].

The difference between the *retreat* and the *nest* is that the latter is closed at both ends, and that it is larger, more solid, and, if

* P.L.S.N.S.W. Vol. ix. (Series 2nd), 1894, p. 154, fig. 1a.

† *Loc. cit.*, p. 120.

anything, more skilfully built. When the periods of moulting or maternity approach, the spider retires to the seclusion of her nest and shuts off all communication from without by closing the apertures. The cocoon is composed of two closely fabricated layers or plaques of silk, the threads of which are crossed and recrossed, and between which the eggs are placed. This is stretched horizontally, the edges adhering to the walls of the nest. During the period of incubation the female mounts guard over her eggs, which she maintains until the young hatch out. But her vigilance does not end there, for until the spiderlings are old enough and strong enough to start in life for themselves, the mother continues to display great solicitude for their welfare. From the time that she enters her nest, and until the brood disperse, the mother remains an absolute and willing prisoner, never once quitting it even for food. By way of illustration of the tenacity with which the mother will cling to her cocoon, I may mention that on one occasion after breaking a nest open, the spider steadfastly refused to budge from her treasure, and even when I proceeded to tear the cocoon with my forceps she still maintained her grasp; and further, when she was eventually removed, it was with the loss of two of her legs.

In those parts of our country favoured by mild winters many species do not hibernate.

ATTIDÆ.

The *Attidæ* are individually exceedingly small spiders, and embrace among their number some of the brightest coloured examples of the Araneidæ, as, for example, *Attus volans*, Camb., and *A. splendidus*, Rainb. Their principal haunts are crevices and interstices of walls and rocks, fissures in the ground, the rugulosities of trees, shrubs, and exfoliating bark. So far as their nesting habits are concerned, they closely resemble the *Drussidæ*.*

* In connection with this remark, Wagner observes, in speaking of the *Attidæ* :—"In certain features of their architecture they approach the *Drussidæ*; in other features, the spiders of other groups."—*Loc. cit.*, p. 76.

Their architecture consists of a retreat in the form of a tube with two apertures; a nest in which they (1) moult, and (2) in which they seclude their cocoons, but to which there is no aperture; and finally the cocoon. These spiders are active during the day-time, and capture their prey either by surprise or pursuit. In the art of stalking prey they are exceedingly skilful. In this they are aided by keenness of vision, in which respect, throughout the whole of the Araneidæ, they have no superior. The subject of vision, however, is not within the province of this paper, and and must therefore be held over for a future occasion; but as the question has been raised, it is only fair to say that a number of eminent authors have recorded both observations and experiments proving conclusively that length of vision is possessed by the *Attidæ* to a rare degree. Among these are Cambridge, Simon, McCook, and Dr. and Mrs. Peckham. Of these the last named writers, after enumerating a long series of experiments, conclude with the following observation:—"We think that our experiments on vision prove conclusively that *Attidæ* see their prey (which consists of small insects), when it is motionless, up to a distance of five inches; that they see insects in motion at much greater distances; and that they see each other distinctly up to twelve inches. The observations on blinded spiders and the numerous instances in which spiders were close together and yet out of sight of each other, showed that they were unconscious of each other's presence, render any other explanation of their action unsatisfactory. 'Light guides them, not smell.'"

Among the Australian *Attidæ* there are many species that do not make a retreat at all, but content themselves with the seclusion afforded by objects within the compass of their sphere of activity, such as nooks and crannies in walls and rocks, the spaces under stones, fissures, and such like. On the other hand, there are some species that seem to be guided more by caprice than

* "The Sense of Sight in Spiders," by George W. and Mrs. Elizabeth G. Peckham. Trans. Wisconsin Acad. Sci., Arts, and Letters, Vol. x., p. 249.

anything else, and which seem to be perfectly indifferent as to whether they fabricate a retreat or nest, or whether they adopt for their use the untenanted habitation of other species, and even the deserted cocoons of insects. I have, for instance, found individuals occupying empty cocoons of a cup moth (*Doratifera*), while others of the same species, and in the same locality, were lurking within silken tubes.* Speaking of this feature of their natural history, Wagner says :—"It is *à propos* to note here that of all the spiders with which I am acquainted, the *Attidæ* are the greatest amateurs [*les plus grands amateurs*], and during moulting or nesting take possession not only of those of other families such as the *Clubionidæ*, *Drassidæ*, *Theridiidæ*, &c., but even those of insects, as well as those of other animals."† The nest, when one is made, closely resembles the retreat, differing from it in so far that it is never open, and that the walls are thicker and more closely woven. The cocoons are spherical, thinly and loosely woven, and look very like a ball of fluff, and are always secured to one of the walls at the centre of the nest. During the period of incubation and the early days of the infancy of her progeny, the female never quits the nest: the young ones remain for a considerable time with their parent, but she never procures nourishment for them, nor, indeed, do they require any until after their first moult. When, however, this has been accomplished, they leave their home, and commence to hunt and stalk their prey.

An old writer, Evelyn, in his work, "Travels in Italy," gives a remarkable and lively description of the tactics adopted by these spiders in hunting and stalking their prey, which, to say the least, is decidedly amusing, and concludes his remarks by observing. "I have beheld them instructing their young ones how to hunt, which they would sometimes discipline for not well observing: but when any of the old ones did (as sometimes) miss a leap, they

* Since the above was written I have found representatives of the *Attidæ* dwelling within the interior of the dead bodies of beetles.

† *Loc. cit.*, p. 68.

would run off the field and hide themselves in their crannies, as ashamed, and haply not be seen abroad for four or five hours; for so long have I watched the nature of this strange insect, the contemplation of whose so wonderful sagacity and address has amazed me; nor do I find in any chase whatsoever more cunning and stratagem observed. I have found some of these spiders in my garden, when the weather towards spring is very hot, but they are nothing so eager in hunting as in Italy."

So far as my experience goes, the system of architecture described in respect of the *Attidæ* is the same throughout, but Wagner has described and figured the nest of *Attus hastatus*, Clerck,* which differs very widely from the foregoing, and which, taken all in all, is of unique interest. This spider appears to prefer the pine for its haunt, as it is only upon that tree that the distinguished araneologist has found it, and as he is a particularly careful and astute observer and an industrious collector, he would have found it in other situations if it affected them. Among the twigs of a branch of a pine, either living or dead, *A. hastatus* constructs its nest. The shape, according to the figures, is almost spherical, and the silken threads are irregularly interlaced. The abundance of silk used in the structure, and its similitude in construction to the cocoons of some Lepidoptera, affords excellent protection. A tube or tunnel runs through the structure, and at each end there is an oval aperture for ingress or egress. The nest is thus divided into two parts, an upper and a lower, and of these the latter is somewhat the larger. At night the spider reposes in the tunnel, and secures herself from attack by closing the apertures. The cocoon, which is oval, is placed in the lower half, and at a distance from one of the openings of about one-third the length of the tunnel, and a little below its "floor." The walls of the tunnel are very thick, although the silk of which they are constructed is loose and flocculent. Obviously a structure such as the one described must naturally form an absolute protection both for the eggs within the cocoon and for the young when they have

* *Lot. cit.*, pp. 74, 75, Pl. v. fig. 100, Pl. iv. fig. 101, and Pl. x. fig. 102.

hatched out and until they are old enough to shift for themselves. As with other species, the young of *A. hastatus* remain for a long time with the mother. A further point of interest in connection with this species is that the female uses the same nest for successive broods, and that frequently after the young have been hatched out from one cocoon, and before they are old enough to start in life for themselves, another batch of eggs is deposited. Upon the approach of danger the young ones seek shelter among the labyrinthine threads of the huge structure. As an instance of the cannibalism of *A. hastatus*, Wagner states that he has found it in the nest of *A. fulcatus*, Clerck, feeding upon the eggs contained in the latter's cocoon, after having devoured the rightful owner.*

In respect of the *Attidæ* it only remains to be added that among those species that do not construct a retreat in which to shelter from predatory foes and inclement weather, or to seek repose during the night, some of the members suspend themselves by means of a thread from the branches of shrubs. In this position, with their legs folded across the clypeus, they are not only enabled to pass the night in peace, but also enjoy complete immunity from their natural enemies. Anyone who will take the trouble during the summer time to examine the shrubs of our scrub lands, or even plants in gardens, may see numbers of these spiders in the position described. Wagner, in support of his statement, says: "I have had occasion to observe this phenomenon in nature, as well as in captivity."†

THOMISIDÆ.

The spiders of this family are, in popular parlance, known as "Crab-spiders," owing to the form and arrangement of their legs, which are laterigrade, and which present much diversity in their relative proportions; classical naturalists, however, have named

* *Loc. cit.*, p. 75.

† *Loc. cit.* footnote on p. 67.

them "aerial" or "gossamer spiders" on account of their habit of transferring themselves from one locality to another, a feat, however, not solely confined to the representatives of this group. Many species of *Thomisidæ* frequent the summits of branches, flowers, and high plants or shrubs, and often form connections between objects widely separated from each other by means of long, single threads of silk, while others conceal themselves amongst herbage, the rugulosity of trees, or in cracks and crevices of rocks or walls. The various species seem to be admirably adapted to their natural haunts both by form and colouration, and often assimilate inanimate objects, both for the capture of prey and as a protection from predatory foes.

The *Thomisidæ* is an extensive family, and has a wide geographical range, but by far the greatest number of species and individuals are found in tropical and subtropical regions. Wagner includes in this family only three genera—*Misumena*, Latr., *Thomisus*, Walck., and *Xysticus*, C. Koch.* *Sparassus*, Wall., and *Micrommata*, Latr., are allotted to a separate family, for which he proposes the name *Sparassidæ*.† Simon,‡ on the other hand, includes within the family no less than six sub-families, with numerous genera.

In writing upon the spiders of the *Thomisidæ*, Wagner, in his great and interesting work, says:—"None of the representatives of these spiders make a retreat nor a construction for moulting. The rejected teguments are found on the leaves without any adaptation" [for moulting].§ In dealing with the question of the architecture of the Araneidæ, *per se*, Wagner is exceedingly careful and accurate, and his expressions and opinions must therefore be treated with respect. Indeed, speaking generally, the statement just quoted is correct, but then this eminent author was naturally unaware of the ingenious nest made by a spider (at

* *Loc. cit.* p. 49.

† Observations sur les Araneina, pp. 119, 120.

‡ Hist. Nat. des Araignées, 2nd Ed., Vol. i., pp. 953, 954.

§ *Loc. cit.* p. 49.

present undescribed, and for which a new genus will be necessary), an undoubted Thomisid—a species of *Misumeninae*.

This interesting spider constructs a bag-like nest which it attaches to branches or twigs, and which is held securely in position by silken threads. The entrance to the nest is at the top. The food of the tenant consists entirely of ants—*Leptomyrme erythrocephalus*, Fabr. These are dragged into the nest, the vital fluids sucked from their bodies, after which the remains are thrown out, and other victims secured. The single nest, figured on Plate XVIII. (fig. 6a) is eighteen millimeters deep by twelve wide. Within and from near the middle to the bottom it is very closely woven and beautifully lined with fine white silk; the silk composing the outer part of the structure is of a dirty yellowish colour, coarse and openly woven. This specimen, together with the architect, was obtained by Mr. Froggatt at Aelalong in 1891. At the time I was busy with this portion of my paper, Mr. George Masters, Curator of the Macleay Museum, Sydney, most opportunely drew my attention to a cluster of nests upon a small branch (Pl. XVIII., fig. 6), together with the architects, collected by him at Glen Oak, Williams River. The spiders proved to be of the same species as those collected by Mr. Froggatt at Aelalong. Altogether there were nine nests, showing that while some of these spiders, as evidenced by Mr. Froggatt's collection, lead an isolated life, at other times they are to be met with in colonies. The form and texture of the nests in the cluster (Mr. Masters' specimen) is exactly like the one taken by Mr. Froggatt; but it will, of course, be understood that each nest is tenanted only by one spider. Mr. Masters, to whom I am indebted for the privilege of figuring the specimen collected by him, tells me that the nests are covered with these ants, and that it was their great numbers on the trees that attracted his attention. From the observations of these gentlemen it would appear that this species is decidedly local, but very common where it occurs. So far I have not seen the cocoon made by this interesting Arachnid.

The Australian species of the genus *Misumena*, Latr., exhibit no departure from the typical nidification of the *Thomisidæ*.

According to L. Koch, of *M. pustulosa*, L. Koch, "the egg-sac is white, longish, rounded at both ends, and encloses large numbers of yellow eggs; the sac is contained in a half-rolled leaf, covered with a thick white web projecting over its end."*

The nest—or pseudo-nest, to quote Wagner—of *Cymbacha festiva*, L. Koch, like those of some other species of the same genus, is an exceedingly interesting piece of work. It consists of an eucalyptus leaf folded over so as to represent a somewhat pyramidiform structure, as illustrated on Pl. XVIII. fig. 7.

Within this structure the spider makes its cocoon. This is somewhat spherical in shape, and consists of two parts, the inferior or basal, and the superior. The latter is the larger of the two, and somewhat thinner in texture; both are united at their greatest diameter. Having completed the cocoon, the female quits her wandering habits, seals down the entrance to the nest, and devotes herself entirely to the care and protection of her eggs, never once leaving the nest for nourishment; and even after the young ones have hatched out, she still maintains her vigilance; but she does not provide them with nourishment, nor does she make any preparation for them in the shape of a nest. After hatching out, the spiderlings remain in the nest until they have undergone their first moult, but when this has been completed they sally forth each to start an independent life.†

In reviewing the spinning work of the Thomisidæ, we find that the members of this group do not spin a web for the capture of prey, but rely solely upon cunning and dexterity; in many instances, as in the *Stephanopisina*, their colouration and rugged appearance, closely resembling bark, are of immense value to them, both as a means of procuring food, and as a protection

* Die Arachniden Australiens, Vol. ii. p. 801.

† In an interesting paper on "The Origin and Relations of the Tube-weaving Habit," in Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 215, Dr. McCook says:—"The Laterigrades I have found sheltered underneath a little tubular tent, guarding their cocoons, although the tube-making habit seems to be least decided among these of all the Araneid families.

against predatory foes; their nests, or pseudo-nests, in which the cocoon is placed, generally consist of a leaf folded over, as in the case of *Cymbacha festiva*, or, as with *Misumena pustulosa*, with the edges only partially warped over, and held in position by silken threads; in some instances the cocoon is attached to the branches of shrubs and trees, and surrounded by a series of irregular threads; the cocoons are always white, and formed of two plaques, the superior and inferior, but no foreign objects are ever interwoven with the envelope; the texture of the envelope or cocoon enclosing the eggs is closely woven, is exceedingly tough and strong, and not easily torn; when the time for moulting arrives, the spider casts its skin wherever it may happen to be; with the exception referred to above, they do not construct a retreat-nest, either for protection against foes or inclement weather, or for undergoing the process of moulting; and, finally, they generally disperse when young by means of aëronautic flight.

Conclusion.—In the course of my remarks in this paper, I have treated only upon the habits and spinning work of such spiders as have come under my own notice and observation. From what I have written it will be seen that the spinning-habits of some are subject to what Wagner terms the “fluctuations of instinct,” as is evidenced by some species of *Attidæ*. Then, again, there are what are termed “deviations of instinct,” and this is demonstrated by the *Epeiridæ*, some members of which do not construct an orbital snare; take for example our *Celænia excavata* and *C. (Thlaosoma) dubia* and the New Zealand species of *Arachnura*; the *Thomisidæ* also furnish an exceedingly interesting deviation, as is instanced in the case of the species of *Misumeninæ* collected by Messrs. Froggatt and Masters in the New England district. In addition to this it may not be out of place here to mention that the genera *Celænia* and *Thlaosoma* (the latter doubtless a synonym of the former) are by some naturalists, as Koch and Simon, placed among the *Epeiridæ*, while by others they are regarded as belonging to the *Thomisidæ*. At first sight, and taking into account their spinning-habit, it would appear that the latter family would be the correct location. This was the view taken by the Rev. O.

P. Cambridge, F.Z.S., when he founded the genus *Thlaosoma*, for he wrote*:—"From the disposition of its eyes it bears great resemblance to the Epeirides; but the laterally extended legs and their relative length, link it more decidedly to the Thomisides, of which family, however, its maxillæ and labium, and other generic characters separate it from all the hitherto characterised genera." Until recently I was myself inclined to regard *C. excavata* and *C. dubia* as members of the family *Thomisidae*; but upon closer study, and after perusing Simon's diagnosis in his magnificent work, "Histoire Naturelle des Araignées," I am forced to the conclusion that they are undoubtedly members of the *Epeiridae*, or, taking Simon's system of classification, *Argiopidae*.

The facts stated in this paper show, as has been proved by Wagner, that too much confidence must not be placed upon the architecture of these creatures as exhibited by them in confinement. Independently of this, however, one great truth has been demonstrated, namely, that any attempt to set up a system of classification upon the basis of a spinning-habit, is at the best chimerical, artificial, and—unscientific.

EXPLANATION OF PLATES.

(PLATE XVII.)

- Fig. 1. — *Epeira pallida*.
 Fig. 2. — *Epeira crassipes*.
 Fig. 2a.— " " epigyne.
 Fig. 3. — *Epeira variabilis*.
 Fig. 3a.— " " epigyne.
 Fig. 3b.— " " underside of abdomen.
 Fig. 4. — *Epeira sylvicola*.
 Fig. 4a.— " " epigyne.
 Fig. 5. — *Argiope extensa*.
 Fig. 5a.— " " abdomen in profile.
 Fig. 5b.— " " epigyne.
 Fig. 5c.— " " cocoon.
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* Journ. Linn. Soc. Vol. x. Zoology, p. 274.

Fig. 6. — *Argiope pallida*.

Fig. 6a. — „ „ eyes.

Fig. 6b. — „ „ epigyne.

Fig. 7. — *Argiope gracilis*.

Fig. 8. — *Dicrostichus magnificus*.

Fig. 8a. — „ „ cephalothorax in profile.

Fig. 8b. — „ „ cephalothorax from the front, showing arrangement of the eyes.

(PLATE XVIII.)

Fig. 1. — *Cheiracanthium silaceum*.

Fig. 1a. — „ „ epigyne.

Fig. 2. — *Attus flavicruris*.

Fig. 3. } Nests of young of *Epeira wagneri*, Rainb.
Fig. 3a. }

Fig. 4. — Nest of *Drassus* sp.

Fig. 5. — Nest of *Attus* sp.

Fig. 6. — Group of nests of *Misumeninae* (? gen. et sp.).

Fig. 6a. — Solitary nest of „

Fig. 7. — Nest of *Cymbacha festiva*, Koch.

NOTE ON THE GENUS *APHRITIS*, C.V.

BY J. DOUGLAS OGILBY.

The genus *Aphritis* was established in 1831 by Cuvier and Valenciennes* for the reception of a small fish which had been obtained in the "fresh waters of Van Diemen's Land" by the naturalists attached to the *Astrolabe*, and received the name *urvillii* in honour of the commander of the expedition.

The genus remained monotypic until 1842, in which year Jenyns† described two fishes under the names of *A. undulatus* and *A. porosus*, from the Chonos Archipelago and the coast of Patagonia respectively; these fishes Günther‡ in 1860, with some hesitation, associated with *A. urvillii*.

In the following year, however, the same author described,§ without in any way questioning its generic affinity, a third and very distinct South American species to which he gave the specific name *gobio*, the diagnosis being drawn up from a dried specimen brought to England by Capt. King from Port Famine, Straits of Magelhaen, whence others were subsequently obtained by the naturalists of the *Challenger*.

Finally in 1872 Castelnau|| received from Bass' Straits a fish between which and *A. urvillii* he professed to find such important differences as to warrant not only specific but generic recognition, and on which, acting on this belief, he therefore bestowed the name *Pseudaphritis bassii*. Writing in 1890 I redescribed¶ this fish from a New South Wales example, and pointed out that the

* Hist. Nat. Poiss. viii. p. 483, 1831.

† Voy. Beagle, Fish. iii. pp. 160-162, 1842.

‡ Catal. Fish. ii. p. 243, 1860.

§ Ann. & Mag. Nat. Hist. (3) vii. 1861, p. 88.

|| Proc. Zool. & Acclim. Soc. Vict. i. 1872, p. 92.

¶ Rec. Austr. Mus. i. 1890, pp. 67-69.

species could not be generically separated from *A. urvillii*, rejecting in fact Castelnau's genus while allowing his species.

At the date of this last paper there were therefore five species, two Australian and three American, united together under the common name *Aphritis*, namely:—*A. urvillii*, C.V.; *A. undulatus*, Jen.; *A. porosus*, Jen.; *A. gobio*, Gnth.; and *A. bassii* (Cast.), Ogil.

In my paper on "*Pseudaphritis bassii*, Casteln.," quoted above, the following paragraph will be found on p. 68:—"In the 'Zoological Record' for 1872 Dr. Günther remarks: '*Aphritis dumerili*. To this species appears to belong *Pseudaphritis bassii*.'. As I am unable to find any description of the former species, I am not in a position to verify or contravene this supposition." The same difficulty still remains, but it has occurred to me that '*dumerili*' may be a misprint or *lapsus calami* for '*durvillii*,' by which name Günther erroneously alludes to Cuvier and Valenciennes' species elsewhere (A.N.H. 1 c.)

A careful study of the characters of these fishes shows that their association in a single genus is unwarranted, and that not only are Jenyns' two species generically separable from that of Cuvier and Valenciennes, but that Günther's *gobio* must be removed from both; necessitating therefore the division of the heterogeneous *Aphritis* of the latter author into no less than three distinct genera.

It now remains only to determine by what names these genera with their accompanying species should be known.

The first author to detect the generic differences between the fish described by Cuvier and Valenciennes and those named by Jenyns was Gill, who, so long ago as 1861, appended to his "Synopsis of the Notothenioids" a note in which he remarks:—"Two species (*Aphritis undulatus* and *A. porosus*), referred by Jenyns to the genus *Aphritis*, not only are generically distinct, but belong to a different family, and form a genus nearly related to *Elginnus*, which will be at an early date described as *Elleginops*."*

* Proc. Acad. Nat. Sc. Philad. 1861, p. 522.

Thirty years later the same author writes as follows* :—"On subsequently endeavouring to diagnose *Eleginops*, the author became convinced that there was no generic difference between it and *Eleginus*, and that the two nominal species were probably the young of the typical *Eleginus*."

In the same paper Gill demonstrates that the generic name *Eleginus*, Cuv. & Val. 1830, was anticipated by Fischer, who, in 1813, proposed it for the accommodation of the *Gadus navaja* of Kölreuter, giving an excellent generic diagnosis accompanied by a good figure of the fish. This of course necessitates the suppression of the name *Eleginus* as applied to the notothenioid genus, for which, however, *Eleginops*, Gill, may conveniently be retained, though I am not aware that the genus has ever been properly characterised by that author.

Having now provided a suitable generic name for the two South American species described by Jenyns, it devolves on us to determine by what name our Australian fishes should be designated.

None of the authors above referred to appear to have been aware that twenty-seven years previous to its use by Cuvier and Valenciennes the term *Aphritis* had been employed by Latreille† as a name for a genus of dipterous insects, and is consequently inadmissible when applied to a fish.

To further complicate the already sufficiently confused synonymy of these fishes Berg,‡ recognising the invalidity of *Aphritis*, proposes to rename the notothenioid genus *Phricus*, and catalogues one of Jenyns' species as *Phricus porosus*, while acknowledging the correctness of Gill's conclusions by allotting the former author's *Aphritis undulatus* to a place in the synonymy of *Eleginus maclovinus*. But since Berg does not recognise the generic difference between *Aphritis urvillii* and *Phricus porosus*,

* Proc. U.S. Nat. Mus. xiv. 1891, p. 305.

† Nouv. Dict. d'Hist. Nat. ii. p. 231, 1804.

‡ Ann. Mus. Buenos Aires, iv. 1895, p. 65.

distinctly stating that his *nomen novum* is proposed "in exchange for Cuvier's generic name," it is evident that *Phricus* must sink into a synonym of our fish for which Castelnau's prior genus *Pseudaphritis* will henceforth stand, leaving without a generic name the neantarctic *porosus*, if indeed it should prove to be a good species and not, as is most probable, an immature form of *Eleginops maclovinus*.

Some months ago I received, through the kindness of Mr. Arthur Wilson, of Geelong, three fine specimens of a *Pseudaphritis* from the fresh waters of Victoria, where it is known to anglers as the "Tupong,"* and having also in my possession two examples of the Tasmanian fish, sent to me by Mr. Morton, I was enabled to institute a comparison between the insular and continental forms, and at the same time correct my generic and specific diagnoses; the result of this comparison leads me to believe that there is but one species common to the fresh waters of Tasmania and south-eastern Australia, the correct title of which is *Pseudaphritis urvillii*.

It now only remains to find a generic name for the *Aphritis gobio* of Günther, all the other species associated under that genus by the author of the British Museum Catalogue having been provided with suitable names. So far I have been unable to ascertain that any generic name has as yet been proposed for this fish, and, following my usual custom under such circumstances, I refrain from designating it, not having access to an example on which to base a diagnosis; to those, therefore, who are more fortunately situated than I—Dr. Günther for preference—the task of suggesting an appropriate name is left.

I append, however, a brief analysis of the three, probably monotypic, genera, which have at various times been associated under the inadmissible title *Aphritis*, giving as far as is possible a full generic along with a partial specific synonymy.

* Consult Hall, Geelong Naturalist, v. No. 4, pp. 5-6, 1896.

ELEGINOPS.

Eleginus (not Fischer*) Cuvier & Valenciennes, Hist. Nat. Poiss. v. p. 158, 1830; Günth. Catal. Fish. ii. p. 247, 1860.

Eleginops, Gill, Proc. Acad. Nat. Sc. Philad. 1861, p. 522, and Proc. U.S. Nat. Mus. xiv. 1891, p. 305 (to replace *Eleginus*, C.V.)

Head somewhat compressed, not elevated, the snout short; mouth small, the maxillary slender and scarcely extending to the vertical from the anterior border of the eye; upper jaw the longer; no palatine teeth; opercle spineless; gill-membranes attached to the isthmus; dorsal fins well separated, of moderate height, the first originating above the insertion of the pectorals; dorsal rays simple or feebly branched; anal with a single spine, originating well behind the second dorsal; lower pectoral rays branched; scales ciliated; head and body without cutaneous appendages.

Type:—*ELEGINOPS MACLOVINUS*.

= *Eleginus maclovinus*, Cuv. & Val. 1830, = *Atherina maclovinna*, Less. 1830, = *Eleginus chilensis*, Cuv. & Val. 1833, = *Aphritis undulatus*, Jenyns, 1842 ? = *Eleginus falklandicus*, Richards. 1846, ? = *Aphritis porosus*, Jenyns, 1842, ? = *Phricus porosus*, Berg, 1895.

Distribution:—Marine fishes from the southern half of South America.

In Berg's excellent paper, of which previous mention has been made, this fish is catalogued by the name *Eleginus maclovinus*, and the family to which it is referred is renamed *Eleginidae*, exception being taken to Gill's *Nototheniidae* on the ground that *Eleginus* is the oldest established genus belonging to the family; but since it has been shown that *Eleginus* is unavailable, Gill's name necessarily holds good, for it will hardly be contended that, despite the change of name, the family must receive its title from the oldest recorded species. In any case I am not prepared to

* *Eleginus*, G. Fischer, Mém. Soc. Nat. Moscou, v. p. 4, 1813; type *Gadus navaga*, Kölreuter.

admit that there is an obligation imposed upon us to arbitrarily derive the name of a family from that of the elder genus, which may not be the most widely distributed and typical association of species. Berg also, when proposing the name *Phricus*, quotes the synonymy as "*Aphritis*, Cuv. 1817." I cannot ascertain that Cuvier ever established such a genus in the earlier edition of his "*Règne Animal*," but even if it were so it does not affect the matter here brought forward, since Latreille's use of the name would still retain its priority.

? gen. innom.

Aphritis sp. Günther, Ann. & Mag. Nat. Hist. (3), vii. 1861, p. 88.

Head compressed and elevated, the snout long; mouth large, the maxillary wide and extending to the vertical from the middle of the eye; lower jaw somewhat prominent;* palatine teeth present; opercle with a spine; gill-membranes?† Dorsal fins contiguous, elevated, the first originating well in advance of the insertion of the pectorals; dorsal rays simple; anal without spine, originating well behind the second dorsal; lower pectoral rays simple; scales cycloid; an orbital tentacle; sides of body with cutaneous appendages.

Type:—*Aphritis gobio*, Günther, Ann. & Mag. Nat. Hist. (3) vii. 1861, p. 88.

Distribution:—Marine fishes from the Straits of Magelhaen.

PSEUDAPHRITIS.

Aphritis (not Latreille) Cuvier & Valenciennes, Hist. Nat. Poiss. viii. p. 483, 1831; Günther, Catal. Fish. ii. p. 24, 1860.

* According to the letterpress of Günther's earlier description; this statement is neither corrected nor corroborated in his later description (Zool. Challenger, Shore Fish. p. 21, 1880), nor in Cunningham's note (Trans. Linn. Soc. London, xxvii. p. 469, 1871), but in the Challenger figure (l.c. pl. ix.) the upper jaw is apparently considerably longer than the lower.

† Probably free from the isthmus.

Pseudaphritis, Castelnau, Proc. Zool. & Acclim. Soc. Vict. i. 1872, p. 92.

Phricus, Berg, Ann. Mus. Buenos Aires, iv. 1895, p. 65 (to replace *Aphritis*, C.V.)

Head somewhat depressed, the snout short; mouth rather small, the maxillary of moderate width and extending to or nearly to the vertical from the middle of the eye; lower jaw the longer; palatine teeth present; opercle with a feeble spine; gill-membranes free from the isthmus; dorsal fins well separated, rather low, the first originating far behind the insertion of the pectorals; dorsal rays branched; anal fin with two semidetached spines, the anterior the longer, originating well in advance of the second dorsal; lower pectoral rays simple; scales finely ctenoid; head and body without cutaneous appendages.

Type:—*PSEUDAPHRITIS URVILLII*.

= *Aphritis urvillii*, Cuv. & Val. 1831, = *Pseudaphritis bassii*, Casteln. 1872, = *Aphritis bassi*, Ogilby, 1890; ? = *Eleginus bursinus*, Cuv. & Val. 1830.

Distribution:—Fresh water fishes from south-eastern Australia and Tasmania.

If the suggestion here made, that *Eleginus bursinus** is identical with *Aphritis urvillii*, be correct, our fish will have to be called *Pseudaphritis bursinus*. *E. bursinus* was said to have been collected by Quoy and Gaimard in Port Jackson during their first voyage to the southern hemisphere in the Uranie; it has not since been recognised.

*Cuvier & Valenciennes, Hist. Nat. Poiss. v. p. 1, 1830.

ON A NEW SPECIES OF *EUCALYPTUS* FROM THE SYDNEY DISTRICT.

BY HENRY DEANE, M.A., F.L.S., AND J. H. MAIDEN, F.L.S.

(Plate XIX.)

E. squamosa.

A medium-sized tree, that is to say, averaging 30 ft. in height, and with a stem diameter of about 15 inches.

Bark.—Scaly, somewhat resembling that of *E. corymbosa*, but the scales thinner. The young stems are of a leaden colour, the outer bark thickens, turns bluish or ashy grey in colour, becomes fissured horizontally and longitudinally, thus taking on the scaly appearance. When the superficial scaly bark is removed, the bark is seen to be of a reddish-brown colour.

Timber.—Deep red.

Seedling leaves (as judged by the suckers)—Ovate, and finally ovate-lanceolate. So far as observed, always alternate and not opposite as in *E. viminalis*, *Stuartiana* and allies. Similar as regards arrangement of leaves, to *E. punctata*, *piperita* and some other species.

Mature leaves.—Narrow- to rather broad-lanceolate or ovate-lanceolate, slightly falcate, $3\frac{1}{2}$ to nearly 6 inches long. In colour pale green to glaucous, the surface glandular-punctate. Veins reddish, the midrib conspicuous owing to its dark colour, the petioles reddish like the veins. The margin thickened outside the marginal vein and coloured like the midrib; marginal vein very near the margin. Transverse veins numerous and fine, making an angle with the midrib of about 50°.

Peduncles.—Roundish, not flattened nor angular. Frequently or usually in pairs; this appearance is, as far as we are aware, characteristic.

The flowers generally from 8 to 12, usually 10 or 11.

Calyx-tube.—Subcylindrical, almost ovate, forming a continuous outline with the operculum. Somewhat urceolate in young fruit.

Operculum.—Ovate, but more or less pointed or beaked, and frequently showing a marked curve to one side. The length of the operculum about equal to that of the calyx, viz., about 3 lines.

Stamens.—Folded in the bud. The anthers almost globular, all fertile, and opening by two large lateral pores. The species in consequence belonging to the *Porantheræ*.

Fruits.—Nearly hemispherical, with a slight tendency to constriction of the orifice; in extreme cases the fruits almost taking on an urceolate form. Size about 4 lines broad by 3 lines deep.

Rim sunk. *Valves* 3 or 4 and slightly exerted.

Range—On sterile sandstone ridges from the Hawkesbury River to near Bulli (as far as known at present).

Affinities.—The anthers require the placing of this species in the *Porantheræ*, and indicate its affinity to *E. hemiphloia* and the "Boxes." Its anthers are far larger than those of the latter species, and it differs in most other respects, *e.g.*, shape of fruits and colour of timber.

Its resemblance to *E. corymbosa* is chiefly in the bark.

Its most obvious superficial resemblance is to *E. punctata*, from which it is at once distinguished by the anthers. Other differences are indicated by the domed rim of *E. punctata*. In the new species the peduncles and pedicels are nearly round, not compressed as in *E. punctata*, while the bipedunculate arrangement has already been noted. The new species has also very pale green leaves, narrower leaves and more ruddy stalks than *E. punctata*.

After observation and consideration of this tree for a number of years we have arrived at the conclusion that it is expedient to declare it a new species.

. Its most obvious characteristic is its scaly bark, of which we take cognizance in giving the specific name to the tree.

EXPLANATION OF PLATE.

Fig. 1.—Twig, showing sucker leaves.

Fig. 2.—Twig, with buds.

Fig. 3.—Leaf, showing venation.

Fig. 4.—Fruits.

NOTES ON SPECIES OF CYPRÆA INHABITING THE SHORES OF TASMANIA.

By C. E. BEDDOME, R.N.

(PLATES XX.-XXI.)

The individuals of this genus found off the coast of Tasmania live in deep water on rocky bottoms, and are consequently not often procured by the dredge. As a rule they are obtained when washed up after gales, but many of such specimens are of comparatively little value to the collector, being water-worn or broken. An experience of nineteen years' collecting has enabled me to bring together a good series of specimens of the species found on these shores, an advantage which former writers and monographers of the genus have not had, and much confusion has consequently arisen in their definitions of the species.

In offering to conchologists a paper embodying my experiences, I desire to acknowledge the assistance I have received from fellow-workers in this and in the other Colonies. Dr. James C. Cox, of Sydney, has given me much valuable information as to the early literature of several species, and has lent me specimens from his collection for comparison and illustration. Messrs. T. W. Bednall, and D. J. Adcock, of Adelaide, Miss Lodder and W. L. May, Esq., of Tasmania, have also been most liberal in lending me specimens.

1.—CYPRÆA UMBILICATA, G. B. Sowerby, Senr., 1825.

This is the largest of the Tasmanian Cypræas. The species was described in the publication known as the Tankerville Catalogue* (Appendix, pp. xxx.-xxxi., Pl. vii., two figs.), compiled by

* A Catalogue of the Shells contained in the Collection of the late Earl of Tankerville, arranged according to the Lamarckian Conchological System; together with an Appendix, containing Descriptions of many new Species. Illustrated with several coloured Plates. London, small 4to. 1825. By G. B. Sowerby, F.L.S. [There are nine coloured unnumbered Plates.]

G. B. Sowerby, Senr., at the request of the late Earl of Tankerville's executors preparatory to the offer for sale of the unique collection. The description is as follows:—

"2260. *Cypræa umbilicata*.—C. testâ oblongo-ovatâ, basi acuminata, superne subrostratâ, umbilicatâ, dorso ventricosus, pallido, fusco-maculato; ventre subrotundato, albido; marginibus rotundatis, albidis, fusco maculatis; aperturâ, dentibusque subdistantibus, pallidissime subfuscis; long. $3\frac{8}{10}$ unc., lat. $2\frac{3}{10}$ unc."

"Obs.—This singular Cowry, of which we have only seen two specimens, neither of them in good condition, appears not to have been noticed by any author; it is principally distinguished by a deeply umbilicated spire, the upper part of the aperture being produced and rather reflected, and by its acuminate base: in general form it resembles a pear, and its colour and markings are like those of some varieties of *C. Tigris*. We are not acquainted with its native country. The other specimen is in our own collection."

In the Zoological Journal for 1826 (Vol. ii. p. 494) will be found a paper by G. B. Sowerby, Senr., entitled—"Descriptions of two new Species of *Cypræa*, principally extracted from a 'Catalogue of the Shells in the Collection of the late Earl of Tankerville.'" In this paper the Latin description of *C. umbilicata*, and the observations with a slight and unimportant variation in the wording are repeated; and the following new matter is added:—

"Shell oblong-ovate, acuminate at its base; upper extremity (of the two lips) subrostrated; spire deeply pressed in or umbilicated, volutions apparent; back ventricose, pale coloured; spotted with brown; under part rather rounded, whitish; margins rounded, whitish, with brown spots; the aperture and the teeth, which are rather distant, very pale brownish. Length $3\frac{8}{10}$; breadth $2\frac{3}{10}$ inches."

"Syn. *Cypræa umbilicata*, Sowerby, in Tankerville Catalogue, Appendix, p. xxx. No. 2260. Cum Icon."

The name again crops up in the next Volume of the Zoological Journal (Vol. iii. 1828, p. 315) in a paper by L. Dillwyn, entitled

—“Remarks on Cypræa described by Mr. Gray,” in which the following passage occurs:—“No. 33. *C. pyriformis* is the *C. umbilicata* of Solander, and as such is mentioned in my Index to the 3rd edition of Lister’s Hist. Conch., see t. 667, fig. 12. It is said in the Portland Catalogue, Lot 255, to inhabit the coasts of Coromandel, and till after the publication of my Descriptive Catalogue I never saw the shell.”

A footnote initialled G.B.S. (doubtless those of G. B. Sowerby, one of the committee who conducted the Journal) is appended to the above remarks, the opening sentence of which is as follows:—“No. 33. I transcribe the following from my copy of Solander’s MS. to show that the *C. pyriformis* of Gray cannot be identical with *C. umbilicata* of Solander.” The long, narrow, brown teeth crossing the base of *C. pyriformis* do not appear to have been noticed by Dillwyn, otherwise he could hardly have confused the two species. However, as he says he had not seen *C. umbilicata* when he wrote his Descriptive Catalogue, he had only Gray’s description to guide him; nevertheless, meagre as that is, it mentions the brown character of the teeth.

Lister’s *Historia sive Synopsis Methodica Conchyliorum*, 3rd edition (1823) referred to by Dillwyn was not Dillwyn’s Descriptive Catalogue of Recent Shells (1817). The former was purely an illustrated work, the latter only a Descriptive Catalogue.

From the above-recorded quotations it appears that the specific name *umbilicata* was given to a Cypræa as a manuscript name by Solander, long before Sowerby described what we now know to be the Tasmanian species, though no doubt the same. Dillwyn tells us in his Descriptive Catalogue of Recent Shells (Vol. i. p. xi. of the catalogue of books consulted by him, dated 1826) that Solander’s MSS. were manuscript descriptions of shells by the late Mr. Solander, in the library of the Right Hon. Sir Joseph Banks; but I am quite unable to discover the date thereof. According to Hanley in Wood’s *Index Testaceologicus* (new ed. 1856, on p. xix. of the summary of the principal abbreviations of authors quoted from) Solander’s manuscripts were never printed, but several copies of them were made, presumably in writing.

Sowerby, therefore, is entitled to be considered the author of the species in question, for although he was not the first to suggest the name *umbilicata*, he was the first to publish a description; possibly as a matter of courtesy he adopted Solander's MS. name.

There are other early references to this species of interest. In the Zoological Journal for 1829 (Vol. iv. p. 66) will be found a paper by J. E. Gray, entitled—"Additions and Corrections to a Monograph of *Cypræa*." Omitting the description in Latin, the following is what Gray has to say of

"31. *Cypræa umbilicata*, Sowerby, App. Tank. Cat. xxx. No. 2260; not Solander. Icon. Sowerby, t. 7, Wood's Cat. App. t. 3, fig. 13."

"Inhabits ———? Mus. Brit."

"Shell oblique-ovate, anterior extremity attenuated and elongated, hinder rather beaked, spire deeply concave; centre of the body whorls ventricose, pale brownish, brown spotted; base rounded, whitish; margin rounded, whitish-brown, spotted. Mouth rather wider in front; teeth rather large, nearly equal, those of the inner lip short; front of the columella flat without any distinct concavity. Axis $3\frac{1}{4}$, diameter $2\frac{1}{4}$ of an inch."

"Obs.—The only specimen known of this shell is now in the British Museum. It has many characters which would lead to a belief that it is a monstrous variety of *Cyp. tigris*, and indeed more specimens are wanted to firmly establish its right to be considered a species."

"The form of the columella has induced me to place this species in the present section. This may have been altered by the same cause which produced the sunk form of the spire."

The next notice of this species is to be found in Vol. iv. of the same Journal, p. 217, 1829, in a letter dated 25th July, 1828, addressed to W. J. Broderip, Esq., entitled—"Notes on Mr. Gray's Additions and Corrections to a Monograph on *Cypræa* (Z. J. iv. p. 66)."

Mr. Sowerby says (p. 221):—"No. 31. *Cypræa umbilicata* requires only a few words. The specimen which Mr. Gray has described is not the only one known, and Mr. Gray has seen the

individual which I have stated in the Appendix to the Tankerville Catalogue to exist in my own collection. It is much the worse of the two, but it helps to establish the species; which, by the way, is more nearly allied to *Cyp. pantherina* than to *Cyp. tigris*."

Fig. 1, (the lower figure) Plate xx., is that of a typical but large Tasmanian specimen of *C. umbilicata*; spire deeply umbilicated, shell thickly spotted with chestnut; base white, highly enamelled; $4\frac{1}{4}$ inches long.

Hab.—Northern Tasmania, towards Circular Head, where some 20 years back it was secured by Mr. W. F. Petterd, and more recently by Mr. R. Thatcher, in numbers after a gale. Since then it has not been found so plentifully. It has also been dredged up off the coast of New South Wales at a depth of 1900 fathoms by the Challenger Expedition, but smaller and paler in colour than the Tasmanian specimens thrown up on the beaches.

Fig. 2, Pl. xx., is that of a specimen found on the beach at Port Stephens, N. S. Wales, by Dr. A. E. Cox, and now in the collection of Dr. James C. Cox, of Sydney; it is such a distinct variety that I consider it worthy of illustration. Like all the members of this species it has a deeply umbilicated spire, is lighter in colour than the average Tasmanian shells, covered with light chestnut spots; base white, but not so highly enamelled as the southern forms found here; it is only $2\frac{1}{2}$ inches long.

A very interesting variety of this species from Circular Head, Tasmania, also is to be found in Dr. Cox's collection; it has been recorded by him in the Proc. Linn. Soc. N. S. Wales, Vol. iv. 1879, p. 386. It is pure white, and of a medium average size.

CYPRÆA ANGUSTATA, Gray (Pl. xxi. figs. 1-3).—The narrow Cowry. This species was described by Gray on p. 497 of Zoological Journal, Vol. i. 1824. After pointing out that it was figured by Gmelin, 3421 (1)—I presume in his Systema Naturæ, dated 1788—in Schreiber's Conch. Einl., j. 77, dated 1788, by Schroeter, j. 150, in 1784, and in Gualtier's Icon. dated 1742, t. 13, f. 22, he says:—

"Inhabits New Holland. Mus. Brit."

"Shell ovate, reddish-brown, or rarely pale brown; the spire prominent, covered; the base convex, white; the margin slightly thickened, rounded, with small, round, black spots; that of the inner lip rounded, only slightly extended; and that of the outer rather sharply edged, with the extremities generally dark; the aperture rather large; teeth equal, small, close; columella rather concave, and rather deep, plaited nearly the whole length; inside pale brown. Axis $\frac{1}{10}$, diameter $\frac{7}{10}$ of an inch."

"This shell has not been taken notice of by any of the French writers, although it is not uncommon in old collections. It varies sometimes in being of a very pale yellowish brown."

Figs. 1, 2, 3, of Pl. xxi., represent examples of what I propose to call the typical group of this very variable species.

The specimen represented on Pl. xxi., fig. 1, measures from the syphonal end to the posterior apertural notch 31 mm., 22 mm. wide, and 18 mm. high, *i.e.*, from base to dorsum; and is one of the finest specimens of the species I have seen. Colour deep chocolate, base bluish-white showing very few spots on the base; the slight dorsal sulcus is covered with chocolate spots on a lighter ground than the dorsum; spire deeply sunk; on the right columellar margin there are 27 strong white teeth sloping into the aperture; the teeth on the left point directly to the aperture, and do not show on the base.

Fig. 2, Pl. xxi., is that of a specimen measuring from the syphonal end to the posterior apertural notch 26 mm., 17 mm. wide, and 13 mm. high from base to the most prominent part of the dorsum. Of a lighter chocolate colour than the preceding example on the dorsal surface; there are two indistinct bands of a darker colour across the dorsum, which are found in many of the varieties of this species; there is a very distinct dorsal sulcus covered with dark chocolate spots; in looking down on the dorsum the spots can be seen on both sides; spire not so sunk as in the preceding example; on the right columellar margin there are 23 strong teeth sloping into the aperture; on the left side the teeth are finer and do not show on the base, which is of a bluish colour.

Fig. 3, Pl. xxi., is that of a specimen measuring from the syphonal end of the posterior apertural notch 25 mm; it is 15 mm. wide, and 13 mm. high from base to the most prominent part of the dorsum, which is of a deep chocolate colour; there is a slight trace of two bands of a darker colour across the dorsum; the shell is more pyriform in shape than either of the preceding examples; spire sunk; a small dorsal sulcus, the spots along which are not so large or numerous, and very few are seen in looking down on the dorsum; on the right columellar margin there are 30 strong teeth running straight into the aperture; on the left side the teeth are very fine and not seen on the base, which is of a bluish colour.

CYP. ANGUSTATA, Gray, *var.* MAYI, C. E. Beddome (Plate xxi. figs. 4-7).—I can pick out four varieties from many examples of this species, and think it best to describe and figure them. Fig. 4 is that of a specimen measuring from the syphonal end to the posterior apertural notch 24 mm., 16 mm. wide and 13 mm. high from base to most prominent part of the dorsum, which is of a rich orange colour; there are two distinct chocolate bands across the dorsum, and above the spire some spots that form a third band; a slight dorsal sulcus with a few chocolate spots on it; the spots on the other side are few, about sixteen in number; on the right columellar margin there are 26 teeth, not so strong as in the typical group, and those on the left are fine and not seen on the base, which is whiter than in the former.

Fig. 5, Pl. xxi., represents a specimen of about the same measurements as fig. 4; dorsum dull salmon colour, two brown bands across dorsum, and between the spire and one of the bands with a raised line of growth.

Fig. 6, Pl. xxi., shows a rather young specimen, but I think it worthy of notice; it measures from the syphonal end of the posterior apertural notch 25 mm., 16 mm. wide and 12 mm. high; dorsum of a dull chocolate colour which extends down the left side of the shell into the aperture; three distinct bands across the dorsum; spire region tinged with orange; a very slight dorsal

sulcus, with very few minute spots, none on the left side; tooothing about normal.

Fig. 7, Pl. xxi., is that of an example measuring from the syphonal end of the posterior apertural notch 21 mm., 14 mm. wide, and 11 mm. high; dorsum a rich orange colour; with two raised lines across the dorsum close together and another near the spire; a pronounced dorsal sulcus covered with chocolate spots which can be seen in looking down on the dorsum; the spots on the left hand side of shell are distinct but not numerous; tooothing distinct, pointing into the aperture; base of the shell with a slight orange tinge.

CYP. ANGUSTATA, *var. SUBCARNEA*, *C. F. Ancey* (Pl. xxi., figs. 8-10).—Retaining Mr. Ancey's MS. name, I recently described this variety in Proc. Linn. Soc. N.S.W. 1896, Part iii. p. 467. Some of the Hawaiian *Cyp. helvola* are of a similar cream colour, which I have little doubt is caused by some defect in the pigment-producing powers of the animal.

CYP. ANGUSTATA, *var. ALBATA*, *C. E. Beddome*.—Fig. 11, Pl. xxi., is that of a specimen measuring from the syphonal end to the posterior apertural notch 25 mm., 18 mm. wide and 15 mm. high; the whole shell snow-white not showing any spots; with three raised lines over the dorsum, and a strong dorsal sulcus; the tooothing on the right side of shell very strong, 24 teeth showing more than half way across the base; on the left the tooothing very fine, not visible on the base.

Hab.—Derwent River, Tasmania. I have seen a specimen of this shell from South Australia. *Cyp. angustata* and many of its varieties are found on the Australian coast.

CYP. DECLIVIS, *Sowerby* (Plate xxi. figs. 12-14), was originally described in Thesaurus Conchyliorum, Vol. iv., and figured on p. 31, Pl. 310, fig. 287, also on Pl. 321, figs. 328, 329,* dated 1880.

The following is Sowerby's original description :—"Shell solid, closely resembling (*affini*) *C. angustata* but more pyriform, more

* This Monograph of *Cypræa* was published about 1870.

abruptly declining in front, and the posterior end more deflexed; the base also is more convex; the aperture is straighter; the dorsum is of a rosy-yellow hue sprinkled over with small maculae; the lateral spots are also smaller."

Obs.—"A more solid shell than *angustata* and *Comptoni*, with a peculiar deflexion of the anterior extremity, which slopes from the back, and it is of a light colour sprinkled over the back."

The finest specimen of this species I have seen is in the collection of Dr. J. C. Cox, of Sydney, N.S.W. Specimens before me differ a good deal in shape and size, but I describe and figure three examples.

The first (fig. 12) is lighter in colour than most specimens, and is more cylindrical than any others I have seen. It measures, from the syphonal end to the posterior apertural notch 27 mm., 18 mm. wide and 13 mm. high. Colour pale bluish on the dorsal surface, which is covered with minute blurred spots; a slight dorsal sulcus covered with dark chocolate spots, very few of them showing on the base of the shell; a few spots on the left side of the shell, none showing on the base, which is of a dull white; with 26 teeth on the right columellar margin sloping into the aperture; those on the left very fine, not showing on the base.

The second (fig. 13) is more pyriform in shape; measuring 25 mm. long, 16 mm. wide and 13 mm. high. Dorsal surface is much darker, being a rich chocolate brown formed by minute dark spots which under the lens seem to run into each other; the dorsal sulcus with smaller and fewer spots on it than in the first example (fig. 12); base white, rounded; the tothing about the same as in first case (fig. 12) but on the left side of the shell a little stronger and more visible.

The third (fig. 14) is the smallest specimen of the three; measuring 21 mm. long, 16 mm. wide, and 12 mm. high. Colour: the dorsal surface pale drab flecked with irregular spots; a very strong dorsal sulcus, with a few darker spots on it, none of them showing on the base which is a very pale brown. The tothing on the right columellar margin stronger, extending well across the base; on the left very little of the tothing is seen.

Hab.—Derwent River, Hobart, Tasmania. I have a specimen of this species of a bluish-white with very few spots on the dorsum.

CYPRÆA COMPTONI, J. E. Gray, Jukes' Voyage of H.M.S. Fly, Vol. ii. Appendix No. x., p. 356 1847, Pl. i. fig. 3.

The following is his description:—"Shell ovate, grey-brown (when young paler zoned), with three darker bands. Spire small, flattened, hidden, right margin rather thickened, sharp edged above, reddish white minutely black dotted, and stained with black, brown above in front; left margin roundish, scarcely thickened, brown dotted. Under side purplish brown, mouth moderate, rather wider in front, teeth small, well defined, the outer hinder ones rather the larger, the columella with an elongated concavity in front not plaited.—Inhab. Port Essington."*

I have not seen specimens from the north of Australia; some from South Australia which I have seen are much darker in colour than Tasmanian specimens, being a dark chocolate.

Fig. 15, Pl. xxi., is that of what I call a typical Tasmanian specimen of *C. Comptoni*, measuring from the syphonal end to the posterior apertural notch 24 mm., 15 mm. wide, and 11 mm. high from base to the most prominent part of the dorsum, which is a dull orange-brown colour; a slight dorsal sulcus covered with small dark spots not showing on the base of shell, which is of a pale orange-brown colour; on the left side of shell there are a few indistinct spots showing on the base; the right columellar margin with 23 teeth sloping into the aperture; the left has the teeth fine, not visible on the base of shell.

Fig. 16, Pl. xxi., represents a variety of this species measuring from the syphonal end to the posterior apertural notch 27 mm., 18 mm. wide, and 12 mm. high; dorsum a pale salmon colour all over, with the exception of a slight trace of two bands of a lighter colour; a slight dorsal sulcus with a few small brown spots, and on the left a line of very faint spots, none of which show on the

* Type in "My Cabinet." "The spots on the left side of the margin are rather the largest, and there are no spots on the lower surface. Named in honour of the Marquis of Northampton, P.R.S."

base, which is white; the tothing is weak on both sides of the aperture, the sunk spire is pronounced.

CYPRÆA PIPERITA, MSS. *Solander*.—Roberts in his paper in Vol. vii. of Tryon's Manual, p. 189, gives Solander as the author of this species, as also does Sowerby in his Thesaurus Conchyliorum, Vol. iv. p. 31. Roberts, however, on p. 222 of the index of same work quoted calls it *Cy. piperita*, Sol. MSS., and as it is put it leads one to suppose that it was so called by Solander. In the Zoological Journal for 1824, Vol. i. p. 498, one finds in Gray's Monograph on the *Cypræidæ* the following description:—

“67. *Cypræa piperita*.—The Peppered Cowry.” “Testa ovato-oblonga, castanea, obscure quadri-fasciata; basi albidâ, marginibus sub-incrassatis, albidis, fusco-punctatis; labiis supra marginatis; columella concava, plicata.”

Now I maintain that this is the original description of this species, and that it was written by John Edward Gray. Following the description in Latin as given comes this:—“*Cypræa piperita*, “Solander's MSS.” Humphrey. Mus. Nost.” What does this mean? It means this, that Humphrey had a collection of shells (Mus. Nost.), and in that collection was a shell to which Solander affixed a MS. name.

Gray in a liberal spirit, when he described the species in his valuable monograph, allowed Solander's MS. name to continue, but was in no way bound to do so. Then follows:—“Icon. Zoological Journal, t. 6.” It is evident that Gray had intended his new species (*piperita*) to be figured on a certain Plate as figure 6; but it never was figured, as the first Plate illustrative of his paper is Pl. vii. This is not a mistake, for in the explanation of Pl. vii., of *Cypræas* described by him, it gives 6 to *Cyp. arenosa*, an excellent illustration of the species. Then Gray's description goes on—“Inhabits New Holland; *Mawe* (Mus. Nost.)” Indicating that Mawe, who wrote up the Linnæan System of Conchology (dated 1823), had a specimen of Gray's new species (*piperita*) in his cabinet from New Holland.

Gray then gives a running minute description of his new species in English as follows :—

“Shell ovate, oblong, pale chestnut-brown, polished, with four narrow, sometimes slightly interrupted bands, one of which is near the spire, and another in the front of the shell, and the other two about the middle of the back. The spire is slightly prominent, and partly covered; the base is convex, white, very slightly thickened on the inner lip, exhibiting the bands through it. The margin of the outer lip and extremities is slightly thickened, white, ornamented with numerous small round brown spots on the upper part, and a large blotch over the spire, and on each side the anterior extremity. The aperture rather wide; the teeth equal, small, close; the columella deeply concave in front and plaited the whole length; the inside purplish-white. Axis $\frac{11}{10}$, diameter $\frac{9}{10}$ of an inch.

“I have had it from several old collections under the above name, and have therefore adopted it out of courtesy, and to prevent confusion.

“When worn it is pale flesh-coloured, with the bands interrupted.”

Should Gray in common honesty be deprived of the credit of having named and described this species? Manuscript names may well be ignored in a case like this.

Fig. 17, Pl. xxi., is that of a specimen of *Cyp. piperita*, Gray, which measures 26 mm. long, 14 mm. wide, and 13 mm. high; there are four blotchy bands of brown across the shell; the whole dorsal surface is covered with minute specks as if it had been peppered all over; there is a slight dorsal sulcus with a few brown spots on it, not seen on the base of the shell, which is a dull white; there are 23 fine teeth on the right columellar margin; those on the left fine and not visible on the base of the shell. This specimen is from Miss Lodder's Collection.

Fig. 18, Pl. xxi., is that of a specimen similar to the one shown in fig. 17, but the specks over the dorsum are fine, hardly visible without a lens; there are four bands across the dorsum composed of square blotches, which are visible on the left base of the shell

into the aperture; measurements are 23 mm. long, 14 mm. wide, and 11 mm. high; the dorsal surface is of a pale orange colour; the dorsal sulcus has a few small spots on it, none visible on the base, which is of a pale orange tint; tothing about the same as in the last example.

Hab.—Rocky Cape and Tasmania (fig. 17); Flinders Island, Bass Straits (fig. 18).

CYPRÆA BICOLOR, Gaskoin, now generally acknowledged to be a variety of this species, is met with in Tasmania Gaskoin's description will be found in the P.Z.S. Part xvi. 1848, p. 92; and good figures of it in Sowerby's Thesaurus Conch. Vol. iv. Pl. xxviii. (Genus Cypræa, Thes. Pl. 319, figs. 288-289).

TRIVIA AUSTRALIS, Lam. (Pl. xxi., fig. 19).—It is not necessary to describe this well known species, but I give measurements and figures of a specimen from Miss Lodder's Collection. Long 18 mm., wide 13 mm., high 10 mm. It is common on the shores of Tasmania and Australia.

EXPLANATION OF PLATES.

Plate xx.

Lower figure—(Fig. 1)—*C. umbilicata*; typical Tasmanian specimen.
Upper figure—(Fig. 2)—,, var., Port Stephens, N.S.W. (Coll. Dr. J. C. Cox).

Plate xxi.

Fig. 1—	<i>C. angustata</i>	} typical group.
Fig. 2—	,,	
Fig. 3—	,,	
Fig. 4—	,,	
Fig. 5—	,,	} var. <i>Mayi</i> , C. E. Beddome.
Fig. 6—	,,	
Fig. 7—	,,	
Fig. 8—	,,	
Fig. 9—	,,	} var. <i>subcarnea</i> , C. F. Ancey, MS.
Fig. 10—	,,	
Fig. 11—	,,	} var. <i>albata</i> C. E. Beddome.
Fig. 12—	,,	
Fig. 13—	} <i>C. declivis</i> , Sowerby.	} ribbed var.
Fig. 14—		
Fig. 15—	<i>C. Comptoni</i> , Gray; typical Tasmanian specimen.	
Fig. 16—	,, var.	
Fig. 17—	<i>C. piperita</i> , Gray (Coll. Miss Lodder).	
Fig. 18—	,,	
Fig. 19—	<i>Trivia australis</i> , Lam. (Coll. Miss Lodder).	

NOTES AND EXHIBITS.

Dr. Norton exhibited specimens of West Australian plants (*Dryandra* and *Anigozanthos*).

Mr. Fred. Turner exhibited a collection of American Grasses, including some rare species from Mexico and Guatemala.

Mr. G. H. Halligan exhibited, for Mr. A. E. Flavelle, a specimen of a recently hatched *Echidna* (about 50 mm. from snout to tail, measured without straightening the specimen), together with the eggshell, both taken from the pouch on September 18th, 1897, at Gradgery, on Marthaguy Creek, County of Gregory, N.S.W.

Mr. North exhibited a specimen of the young in down of the Black-fronted Dotterel, *Ægialitis melanops*, Vieill., which he had caught in the dry bed of Cook's River, at Enfield on the 19th inst. It is apparently about three days old, and has the general colour above buff; a narrow black line extends from the base of the upper mandible below each eye and connects with a broad black collar around the nape; a similar black line above the fore part of each eye meets towards the crown of the head and forms a V-shaped marking; on the occiput a conspicuous white crescent bordered in the centre of the inner side with a blackish band; a broad black line extends through the centre of the wing-coverts around the sides of the body and meets in a point at the tail; in the centre of the back is a round black spot succeeded by another on the lower back, and a short black streak on the rump; short pen feathers of the tail which are just appearing black tipped with buff, on each side of the tail a tuft of long black filamentous down; all the undersurface and edge of the wing white; the lower sides of the body washed with buff; base of upper mandible reddish-flesh colour, of lower mandible orange, tip of bill black; iris dark brown, nearly black; legs and feet pale ochreous-yellow. Total length in life when in a prone position, 3 inches; weight $\frac{1}{4}$ of an ounce.

Also a beautiful nest of the Black-capped Honey-eater, *Melithreptus lunulatus*, Shaw, obtained in a Eucalypt at Belmore on the

21st inst. It is of the usual cup-shaped form and is constructed almost entirely of white fowl feathers and white cow-hair, matted and held together with fine strips of bark-fibre and a few pieces of string. The nest, which measures exteriorly $2\frac{1}{2}$ inches in diameter by $3\frac{1}{2}$ inches, was found close to a poultry farm, and contained two young birds just able to fly.

Mr. Musson contributed a Note on the trimorphic character of *Anguillaria dioica*, R.Br. One thousand specimens of this variable plant (all those growing on six square yards) were pulled up and sorted. Of these, 26 (or 2·6 per cent.) were polygamous; 510 (51 per cent.) had potentially male flowers only, the pistils being rudimentary; and 464 (46·4 per cent) had female flowers only without indication of even rudimentary stamens. Other peculiarities furnished by these specimens were also noted. As the species occurs in all the Australian Colonies it would be of interest if observers elsewhere would tabulate their experiences. Sufficient data might thus be accumulated for satisfactory generalisation, as *Anguillaria*, like *Pittosporum undulatum*, seems to be in an advanced stage of transition towards complete separation of the sexes.

Dr. Cox exhibited, in illustration of Lieutenant Beddome's paper, specimens of *Cypræa subcarnea*, Ancey, and var., *C. declivis*, Sowb., *C. angustata*, Gray, and vars., *C. comptoni*, Gray, and vars., and *Trivia australis*.

Mr. Fletcher exhibited some hymenopterous insects (Fam. *Thynnidae*) forwarded last week by Mr. C. F. Bolton, of Moorong, Wagga, as a sample of myriads closely clustered on the wires of his vineyard fence. They were thickest in one spot where the clustering swarms extended over a distance of about five feet on each of three wires—one above another. The insects evidently had recently emerged from their underground cocoons. Possibly on account of the mild winter they had made an appearance earlier than usual and in advance of the flowers. A week later some swarms were still to be seen on the wires.

WEDNESDAY, OCTOBER 27TH, 1897.

The Ordinary Monthly Meeting of the Society was held at the Linnean Hall, Ithaca Road, Elizabeth Bay, on Wednesday evening, October 27th, 1897.

Professor J. T. Wilson, M.B., President, in the Chair.

The President referred to the contemplated appointment of the Macleay Bacteriologist, and intimated that in about a fortnight's time advertisements inviting applications from Candidates in the Colonies would appear in the Sydney and other newspapers.

DONATIONS.

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DESCRIPTIONS OF NEW SPECIES OF AUSTRALIAN
COLEOPTERA.

BY ARTHUR M. LEA.

PART IV.

CICINDELIDÆ.

CICINDELA SLOANEI, n.sp.

♂. Rather narrow and subparallel; elytra subopaque, elsewhere shining. Head coppery; clypeus purplish-brown, a testaceous stripe down its middle; mandibles white, their apices brown; antennæ testaceous, each joint tipped with brown. Prothorax coppery. Elytra chocolate-brown, distinctly margined with white, extreme margins testaceous. Body beneath and legs reddish-testaceous, tips of tarsal joints and claws brownish.

Head large, longitudinally corrugated, near apex and base in middle irregularly transversely or obliquely corrugated; disc feebly concave; a whitish seta on each side near antennæ, and a longer one on each side close to eyes; eyes large, subreniform; antennæ slender, passing intermediate coxæ. *Prothorax* slightly longer than wide, transversely and irregularly corrugate, base and apex compressed; middle raised, bilobed, and with a feeble median line. *Elytra* slightly narrower than head across eyes, subparallel, about thrice the length of prothorax; each with an irregular row of shallow punctures (about five in number) at one-third from suture; with other and smaller punctures, which are moderately distinct near shoulders and only traceable with difficulty elsewhere; suture slightly thickened near apex. *Legs* very long, femora and tibiæ with rather sparse whitish setæ; tarsi (especially the anterior) with denser and blackish setæ. Length 9; width 3 (vix) mm.

♀. Differs in being larger (12 mm.), head smaller, eyes less prominent, clypeus unicolorous, apical segment of abdomen suffused with brown, anterior tarsi clothed as the four posterior.

Hab.—Western Australia: Mullewa. Three specimens (one of which is now in the possession of Mr. G. Masters) were obtained in the bed of a dry creek.

The white lateral stripes of the elytra are very distinct; the elytral punctures occasionally appear as if gilded.

HISTERIDÆ.

HOLOLEPTA MASTERSI, MacL.

In Masters' Supplementary Catalogue the above species is placed as a synonym (on the authority of Lewis) of *H. Sidnensis*, Mars. This is a mistake; the beetles themselves are very much alike, but the larvæ and pupal cases are very distinct. The case of *H. Sidnensis* is constructed in the fibre of the core of various species of *Xanthorrhæa*, and internally is of a shining jet black colour; that of *H. Mastersi* is brown inside, and is constructed on a somewhat different plan. The larvæ are dissimilar in several respects, that of *H. australis* (of which, however, I do not know the pupa) being decidedly closer to, though apparently distinct from *H. Sidnensis*. I have taken adults, larvæ and pupæ of *H. Mastersi* under rotting bark of several forest trees on the Tweed and Richmond Rivers; the two other species I have obtained only from *Xanthorrhæa*.

TENEBRIONIDÆ.

Having recently examined Hope's original descriptions and figures of *Helæides*,* and being enabled therefrom to identify some of the species I possess (scarcely possible by the descriptions alone), a few notes may be of use.

Judged by the illustrations *Helæus Bremeri*, *contractus* and *testudineus* would appear to belong to *Sympetes*, and this I am satisfied is the case. *H. Bremeri*, which Sir William Macleay thought belonged to *Encara*, is the same as *Suragus Duboulayi*, Pasc., and the latter name must therefore fall; the species (which has already been referred to *Sympetes*) is variable, and widely

* Trans. Ent. Soc. Vol. v. 1848, pp. 52-56, Plates 6 and 7.

distributed along the south-western coastal regions; I have specimens fully as large as those described by Hope, and others very much smaller. *H. contractus* I have from Pinjarrah; it is intermediate between *Sympetes tricostellus* and *S. Macleayi*. *H. testudineus* (from Port Essington) appears to be very close to my *Sympetes undulatus*; Hope figures the anterior tibiae as having a free apical spur longer than the 1st tarsal joint; in *undulatus* there is a slight triangular extension (considerably shorter than the 1st tarsal joint) of the tibia itself, but no free spur.

H. marginellus appears to be remarkably close to *Saragus rudis*, MacL., and the dimensions given by Macleay are identical; there are, however, a number of species rather closely allied.

On Plate vi., fig. 6, Hope figures a true but headless *Helæus* to which I can find no reference whatever; I think I have the species (from Swan River) which is close to but distinctly larger than my *granulatus*. It is certainly not referred to in Volume v., nor can I find any mention of it in the succeeding volumes.

MITUA BIDWELLI, Hope (W. S. Macleay, MSS.) (Trans. Ent. Soc. Vol. v. p. 56, Pl. vii. fig. 6).—This species does not appear in the Catalogue. Hope does not give an exact locality, which may account for its omission, but the title of his paper is "Descriptions of several new Species of *Helæidæ* from Australia." Judging by the illustration the species appears to belong either to *Styrus* or to *Nyctozoilus*.

PTEROHELÆUS TRISTIS, Lea.—In affixing this name (P.L.S.N.S.W. 1896, p. 285) I overlooked the fact that Sir Wm. Macleay had already referred *Saragus tristis*, Germar, to *Pterohelæus*. As a substitute I propose the name *tenuistriatus*.

HELÆUS ELLIPTICUS, n.sp.

Oblong-elliptic, softly shining, almost impunctate, uniformly piceous-black, upper surface glabrous.

Head punctate, a distinct longitudinal impression between eyes. Antennæ extending to intermediate coxæ. Prothorax transverse ($11\frac{1}{2} \times 8$ mm.); margins wide, strongly reflexed, posterior half thickened and slightly curved, anterior angles scarcely obtuse,

left crossing right; posterior angles very acute and shining, the base near the sides rather minutely but distinctly and evenly serrate; disc with a narrow median carina, feeble just behind head but strong towards base, and seen from the side resembling a parrot's beak. *Scutellum* transverse, curvilinearly triangular, with an obtuse median ridge. *Elytra* slightly wider than prothorax, basal half parallel; margins, except at extreme base, considerably narrower than on prothorax, decreasing to apex, reflexed and rather strongly recurved; suture scarcely thickened; a narrow shining carina on each side of suture continued almost to apex, towards which it curves inwards and then outwards; just before margin a row of small shining granules not quite continuous to base or apex. Body beneath finely punctate and feebly longitudinally corrugate. Legs with short brown pubescence. Length 21, width $12\frac{1}{4}$ mm.

Hab.—Western Australia: Geraldton.

In this species the elytral costæ are continued almost to the apex, and are not abruptly terminated; for the greater part of their length they are parallel and separated $3\frac{1}{2}$ mm., at the apex they are separated $2\frac{3}{4}$ mm., and at about the middle of posterior declivity 2 mm. Two species, *moniliferus* and *consularis*, in Macleay's 3rd section appear to approach it, judging by the descriptions; from the former it differs in being considerably smaller, of uniform colour, and with very small tubercles of a somewhat conical shape near the marginal sutures; it can scarcely be the latter species which is described as *obovate*; prothorax with the posterior tooth large, in the form of a *compressed triangular spine*; elytra with the *raised suture* having on each side at a short distance a sharp costa *crenated* on both sides.

SARAGUS LUGUBRIS, n.sp.

Suboblong, somewhat convex, opaque, piceous-black.

Head densely and rather coarsely punctate; clypeal suture deeply marked at sides and very feebly pubescent. Antennæ extending to intermediate coxæ. *Prothorax* transverse, apex

semicircularly emarginate, anterior angles obtuse, posterior acute; disc and margins densely and rather coarsely but shallowly punctate, disc with a very feeble median line; margins rather narrow, flat, not at all wrinkled, very feebly pubescent. *Scutellum* small, punctate. *Elytra* parallel to near apex, scarcely wider than prothorax, margins extremely narrow; middle somewhat flattened, suture feebly raised and softly shining; each with three narrow shining costæ disappearing towards apex, and irregular throughout, the intermediate feebler than the others; interspaces with numerous very minute setose granules, very minutely punctate and indistinctly transversely wrinkled. Body beneath and legs minutely pubescent, the former with punctures above the average size in other species and obsoletely corrugate. Length $15\frac{1}{2}$, width $9\frac{3}{4}$ mm.

Hab.—Upper Ord River: E. Kimberley (Mr. R. Helms).

Of the *lævicollis* type, but easily distinguished by its non-wrinkled prothoracic margins (in some lights appearing dark brown) and almost entire absence of elytral margins. The almost microscopic granules on the elytra are not at all irregular in size.

XYLOPHILIDÆ.

Mr. T. L. Casey has recently* divided the American species of *Xylophilus* into thirteen genera (exclusive of *Xylophilus* itself), of which twelve are characterised as new. At the same time he remarks:—"The species of the various genera adhere closely in general appearance to the type form." If Mr. Casey's genera are to be recognised, many genera will be required to contain the Australian species, and this, I think, is highly undesirable. The antennæ and eyes are very variable, both sexually and specifically; and any division of the group into genera which takes these organs as its principal characters is likely to prove very misleading. I must here enter a strong protest against the splitting up of *Anthicus*† as proposed by Mr. Casey, principally on account of mesosternal modifications.

* Annals New York Academy of Sciences. Vol. viii. p. 772 *et seq.*

† *A. floralis*, Linn., is placed in a new genus (*Hemantus*).

Following is a list of the Australian species of *Xylophilus* hitherto described :—

1. *undatus*, Gemming; = *fasciatus*, Bohem.; = *Blackburni*, Lea (*Syzeton*).
2. *abnormis*, King (*Anthicus*); = *lætus*, Blkb. (*Syzeton*).
3. *lateralis*, Blkb. (*Syzeton*).
4. *mundus*, Blkb. (*Syzetoninus*).
5. *inconspicuus*, Blkb. (*Syzetoninus*).
6. *alpicola*, Blkb. (*Syzetonellus*).
7. *immaculatus*, Lea (*Syzeton*).
8. *quadrioveatus*, Lea (*Syzetoninus*).
9. *impressicollis*, Lea (*Syzetoninus*); = *morulus*, Champ.
10. *variegatus*, Lea (*Syzetoninus*).
11. *crassicornis*, Lea (*Syzetoninus*).
12. *sordidus*, Lea (*Syzetonellus*).
13. *humeralis*, Lea (*Syzetonellus*).
14. *pectinicornis*, Champ.
15. *fluctuosus*, Champ.
16. *albonotatus*, Champ.*
17. *parallelus*, Lea (*Syzetoninus*).
18. *basicornis*, Lea (*Syzetoninus*).

XYLOPHILUS EUCALYPTI, n.sp.

Suboblong, slightly flattened, shining. Pitchy-black; muzzle subferruginous; antennæ testaceous, basal joint more or less dark, apical joint sometimes infusate, sometimes paler than preceding joint. Prothorax uniformly clear reddish-testaceous. Legs testaceous; femora, especially the posterior, tinged with brown. Clothed all over with very short griseous pubescence. Head and prothorax densely and minutely punctate, the latter more strongly punctate at base. Elytra, except basal portion, feebly punctate.

Head rather large, transverse; eyes comparatively small, lateral, coarsely faceted, distant. *Antennæ* rather short, basal joint thick,

* Described from Adelaide River. I have taken specimens at Perth.

2nd rather short and thick, 3rd-5th thin, 4th-11th feebly increasing in width and subequal in length. *Prothorax* convex, transverse, subquadrate, sides and angles feebly rounded, a feeble transverse impression across middle, more noticeable on sides than on disc; base with a more distinct impression, which is slightly interrupted in middle. *Scutellum* subtriangular, apex rounded. *Elytra* not twice the width of prothorax and about thrice its length, not covering pygidium, depressed at basal third; a feeble longitudinal impression near shoulder; shoulders feebly rounded; sides parallel to near apex. *Legs* thin; femora slightly thickened; anterior tarsi short, four posterior long; 1st joint of four posterior equal in length to all the others. Length 2, width 1 (vix); range of variation in length $1\frac{3}{4}$ - $2\frac{1}{2}$ mm.

Hab.—Western Australia: Albany (Mr. R. Helms); Pinjarrah (Lea; beaten from boughs of young gum trees).

The colouration of this species renders it very distinct. The reddish prothorax gives it a resemblance to *humeralis*, from which species, however, it differs in many particulars.

CURCULIONIDÆ.

Subfamily LEPTOSIDES.

CATASARCUS.

Specimens of this genus are exceedingly abundant in Western Australia; scarcely any collection of Coleoptera from that colony, no matter how small in numbers, but has a number contained in it. In the Transactions of the Entomological Society for 1870, Mr. Pascoe described 34 supposed new species, and at the same time he gave a tabulation of them (including those species previously described) and divided the genus into three sections; it is the second section of that tabulation that I shall now treat of.

In his general remarks preceding the descriptions of the species, Mr. Pascoe says:—"The sexual differences appear to be very slight. The male is a little smaller, and is narrower behind than the female, the elytra curving inwards very perceptibly towards

the apex. It is only a few of the species, however, that we are able to pair." The remark italicised is certainly a mistake. I have taken a great many pairs *in copula* and could readily distinguish the sexes. These circumstances induce me to think that perhaps Mr. Pascoe has described the sexes in several instances as being distinct species. I have gone very carefully into the question, and have been irresistibly forced to the conclusion that the *whole* of the names given in the 2nd section appertain to *spinipennis*, Fahrs., and as this conclusion, if correct, as I have no doubt it is, necessitates the elimination of seventeen names from the Catalogue I propose to give my reasons in full for thinking so.

I have personally collected over much of the ground traversed by Mr. Frank Duboulay (from whom Mr. Pascoe received the majority of his specimens) in the Champion Bay district; I have had many specimens brought in by the various inspectors and correspondents of the Bureau of Agriculture; and I have seen the collections of other entomologists and of several museums; but I have *never* seen more than one species of *Catasarcus* having four tubercular spines on the disc of the elytra. Had the species been as numerous as Mr. Pascoe thought them, I think I could not have failed to meet with more than one.

In his supposed species, Mr. Pascoe appears to have had but few specimens to judge from, as in only four—*intermedius*, *humerosus*, *bellicosus*, and *cicatricosus*—does he state or imply that he had more than one specimen; and in *spinipennis*, *marginispinis*, and *carbo* he distinctly implies that his descriptions were taken from unique specimens.

Mr. Pascoe remarks :—" But the best characters of the species are afforded by the elytra, only, though these are obvious enough to the eye when compared with one another, they are extremely difficult to define; the sculpture is nearly always of the same type, seriate- or sulcate-punctate, with tubercular elevations between; its peculiarities often masked by a covering of scales, the absence of which, in worn individuals, serves to throw a doubt on their validity. . . . The first pair (median [of spines] are generally near the middle of the elytra, calculating the

middle from a line extending *over* the length of the back, the second (posterior) a little behind them, and invariably nearer the suture. . . . A very peculiar substance, which the French call 'enduit' . . . which I have mentioned as 'a sort of exudation' is found in a few species. Two have it in the form of small grains as if sprinkled with sand, and two others have a waxy varnish, which, however, appears to be a part of the true integument."

Scales.—The scales on *Catasarcus* are of comparatively large size, and are extremely easily abraded. I have placed densely squamose specimens in spirits, and, on removing them some months later, noticed that the scales had almost disappeared from the derm, a few only remaining in the punctures. On reading Mr. Pascoe's descriptions, it will often be noticed that he speaks of scales filling the punctures but absent elsewhere, and he makes considerable use of the scales in his tabulations. The discal spines (except occasionally at their bases) are entirely destitute of scales; a few straggling ones may sometimes be seen on the posthumeral; otherwise the whole of the upper surface appears to be almost equally clothed; scales may frequently be seen in a small dense patch about the scutellar region and to a less extent in the prothoracic impressions, the rest of the surface being nude. This is due to those parts being less subject to abrasions; the rostral grooves are usually densely filled with scales, even in greatly abraded specimens; this is due in great measure to those parts being provided at the sides with short stout setæ. I have taken two specimens exactly alike in all details and then removed all the scales from the prothorax of one of them; on comparing them together the prothorax of the one appears to be proportionately *much wider* than the nonabraded specimen (compare *brevicollis* and *nitidulus*, &c., in tabulation). The *colour* of the scales in this genus (and perhaps in the majority of *Curculionidæ*) is of but little value, as it is often extremely variable and subject to considerable alteration, after death, through the action of grease, age, spirits, &c. Besides in this genus (as well as in others) they are often concealed by a floury exudation (soluble in spirits, &c.).

This exudation appears to be secreted during the whole of the insect's life (as I understand is also the case in the *Cleonides*); I have entirely removed it from living specimens with alcohol, and in a few days it would again make its appearance. The plant upon which the beetle feeds appears to cause the colour of the exudation to vary; for instance, on specimens captured on Eucalypts it is usually of a reddish-ochre colour; on Banksias it is white to cream, and on several plants I have noticed it to be pale green.* The *shape* of the scales in *Curculionidæ* may, however, be relied upon, and I am convinced could be usefully employed in generic and subfamily divisions; their size and pattern are often useful characters, but (the latter especially) are somewhat subject to variation. I think a description of the sculpture of a species would be greatly enhanced in value if it were taken from entirely abraded specimens.

Varnishing.—This is not confined to Section 2, but is repeated in species of both the other sections, especially in the 1st. It gives the specimens affected a peculiar appearance, in some causing them to assume the look of beetles that have been roasted. It is not a clothing, nor is it soluble in water, alcohol, chloroform or ether; that it is liable to appear on any specimen I fully believe, and am rather inclined to think it an appearance of old age, and caused by rubbing against the foliage in which the specimens live. Many specimens may be seen where the varnishing or “glairing” is present only in spots and patches irregularly disposed over the surface and legs; in others it causes the specimen to appear as if enamelled; frequently the elevations of the elytral interstices and the prothoracic ridges appear as if the varnishing had but just commenced. In some specimens it is milky, and in others it is of a dull leaden colour. Specimens are extremely common on a very soft-leaved plant in the coastal districts, and all so obtained by me were without the varnish and much more densely squamose than specimens from Banksia, Acacia, and

* A specimen recently received from Geraldton is densely clothed with exudation of a lemon-yellow colour.

others with hard or comparatively hard leaves, from which the varnished specimens were taken; moreover, wherever the varnish is seen scales and the smaller punctures are invariably absent.

Posthumeral spines.—These are subject to very great variation; in some specimens they are fully four times the size that they are in others; in most sharp, in a few appearing as little more than a rather sharply pointed granule or even obtuse tubercle. In the majority of specimens they are usually directed a very little backwards from a right angle with the derm; in others they are pointed a little forwards. Their apices are usually slightly recurved backwards, but occasionally forwards; in some they are perfectly straight. They are nearly always black, but sometimes tinged with red.

Discal spines.—These also are individually as well as sexually variable. In colour they vary from pale red to pitchy-black. In the males they are usually (but not invariably) placed much closer to the base than in the females, and are much more slender; in the latter sex they are frequently almost equal in length and thickness, and may usually be described as briefly conical and almost straight. In the males the posterior pair are sometimes fully thrice the length of the anterior, but they are usually about once and one-half to once and two-thirds their length; in a few specimens I have examined they are almost equal. They are usually curved inwards at their apices, but are occasionally straight. The apices of the anterior spines are occasionally in a direct line with the base of rostrum, sometimes with anterior coxæ, but usually with the posthumeral spines. They are sometimes smooth and shining throughout, but usually appear as if obsoletely granulate, especially at their apices, where they are also usually provided with blackish setæ; their lengths vary from one to four millimètres.

Sexes.—Besides differences noted elsewhere, the sexes are usually different in size, the male being a smaller and more convex insect with larger and more distinct punctures, coarser elytral interstices, longer legs, wider tarsi, the dentition of anterior tibiæ more distinct, larger club, shorter rostrum, thorax

of slightly different width, and the intercoxal process of abdomen wider than in ♀.

Other variations.—The rostral carinæ are usually more distinct in ♂ than in ♀, but sometimes *vice versa*; the central one of the forehead is often entirely obsolete; it is usually sufficiently distinct and occasionally sharply raised. The transverse impressions of the prothorax are very seldom equal in depth, the posterior usually being distinctly the shallowest, and it is sometimes entirely concealed by scales. In an occasional specimen the eye appears (*carbo*) to be almost perfectly circular, and more convex than is usual; this is caused in part by a small ridge which is sometimes beneath the lower extremity of the eye, and partly by the denudation of scales; it is usually the case, however, that the eyes are slightly more convex and smaller in ♂ than in ♀.

Before dealing in detail with Mr. Pascoe's table (Trans. Ent. Soc. Lond. 1870. p. 16) I would here remark that tabulations dependent upon the comparative proportions of parts (unless such as there is no possibility of being in doubt about) appear to me to be more likely to lead to confusion than to be of practical value. In describing a new species of *Catasarcus* the Rev. T. Blackburn remarks* :—"I cannot say confidently where this species would fall in Mr. Pascoe's table of *Catasarci*, for I am unable to arrange the species of the genus in Mr. Pascoe's groups, where a main distinction† consists in the species being (*a*) moderately or (*b*) strongly 'convex above.' If this species is regarded as 'moderately' convex above it must be near *opimus*; if 'strongly' it is probably near *effloratus*."

Mr. Pascoe widely separates his supposed species on sexual differences, and also on account of the scales, and as the scales in most insects are exceedingly liable to abrasion I am of opinion that they should scarcely even be used for this purpose.

I now proceed to take the names seriatim :—

CATASARCUS SPINIPENNIS, Fahrs. (Mast. Cat. Sp. No. 4530).—As this is the original description, Fähræus's name must stand.

* Report of the Horn Expedition to Central Australia, Part II., p. 289.

† Section 1.

Pascoe says :—"I have only been able to find *one* specimen to which I think the following of Fahraeus's characters will apply—'fronte depressa, rugosa, griseo-squamosa, vix carinata'; as to the sides of the prothorax 'pone medium fere parallelis'; and as to the elytra '*striis in disco flexuosis*'; all the rest are characters either common to many species or which may be expected to vary." The character I have italicised is one which is common to all the spinose species of *Catasarcus*, and is one which is noticeable in numerous striated insects having tubercles or spines on the elytra; the striae either become interrupted and frequently terminate at the tubercles, or else (as in the present species) make a detour to avoid them.

C. NITIDULUS.—Pascoe remarks :—"This species may be considered as most allied to *C. spinipennis*, from which it will, however, be at once distinguished by its carinate front."* In the tabulation it is separated from *brevicollis* by having the "prothorax less than twice as broad as long"; this is evidently only a sexual character; Pascoe's specimen was probably an abraded ♂.

C. INTERMEDIUS.—Evidently described from female specimens having the anterior of the discal spines very small; I have a specimen in which these spines are almost obsolete.

C. BELlicosus.—In the tabulation mentioned as having "carina near the eye well-marked," possibly it is more distinct on account of being "nearly without scales," but in any case the distinctness or otherwise of this carina is subject to considerable variation, and therefore not to be depended upon. The "head and rostrum broad" would seem to imply that Pascoe's specimens were males.

C. ECHIDNA.—"Closely allied to *bellicosus*, but, owing to the more numerous scales, apparently very different." It seems extraordinary that Mr. Pascoe, who in his time must have examined many thousands of weevils, should make such a remark: "The head and rostrum are, however, narrower, and the grooves

* See notes under "other variations."

are well filled with rounded scales." Evidently Pascoe's specimen was a female in good preservation.

C. ARANEUS.—"Carina near the eye obsolete." This, according to Pascoe, is its strongest character, and as it is one sexually and individually variable, it is not worth consideration.

C. ALBUMINOSUS.—"There is no appearance of scales on the upper surface of this species, which is a very remarkable one, on account of its smooth, somewhat varnished look, including also the spines." Evidently described from an old ♂. See notes under "varnishing."

C. HUMEROSUS and *C. FUNEREUS*.—In the tabulation these are separated by such characters as "Elytra scaly," and "Elytra with a few straggling scales only." The punctures in abraded and perfect specimens of the same species look very different to the eye, and Mr. Pascoe makes a leading feature of the density or otherwise of the scales in his tabulation, evidently assuming that all his specimens were in perfect condition. Another leading and equally untrustworthy character he employs is—"Posterior spines stout, broad at the base," in comparison with "Posterior spines more slender, not so broad at the base."

C. BREVICOLLIS.—Probably described from a female specimen; the width of the prothorax appears to be subject to sexual and individual variation, but this is more apparent than real.

C. MARGINISPINIS.—Described from a small and well preserved ♂. In his description Mr. Pascoe mentions—"Two minute tubercles on each side of the scutellum at the base." In many of my specimens there is an appearance of small tubercles close to the scutellum; they vary in size sometimes even on an individual, and are usually more pronounced in the males.

C. CAPITO.—"Scales on the elytra mingled with a sand-like exudation." There appear to me to be two ways to account for this; the mealy exudation (noted under "scales") in greasy or old specimens sometimes rolls up into minute balls which give a sandy appearance to the parts affected; on the other hand, it may actually have been sand. The country about Champion Bay has

numerous small hills of very fine foraminiferal sand, and in every collection of insects that I have seen from that locality a number of specimens have been partially covered with it. The sand is mixed with powdered limestone and extends in patches for at least 20 miles inland; when collecting on a windy day it frequently blows into the collector's boxes and bottles. I have a number of specimens of *Catasarcus* and other weevils from that locality (some taken two years ago) on which this sand or grit is present as I write. In Pascoe's description and in the tabulation there is nothing else needing comment. His specimen was evidently ♀.

C. OCHRACEUS.—“The elytra of this species are closely covered with scales of a clear ochre-yellow, except a broad abbreviated stripe of pale ashy at the side.” This goes for nothing; it may have been an individual variation or caused by the mealy exudation that all the species give off. In the tabulation it is mentioned as having “scales on the elytra adpressed, *with thick black setæ posteriorly*, issuing from small naked points.” This would seem to imply that the setæ were on the elytra, and should this be the case it would be a strongly marked variety, as in all the hundreds of specimens I have seen none have thick black setæ towards the apex of elytra (except, of course, on the spines). In the description, however, Pascoe does not mention elytral setæ, but states “body beneath . . . having small punctiform spaces . . . on each of which is a longish seta” and “legs . . . with numerous black setæ on the tibiæ and tarsi.” So that probably the setæ are not on the elytra, and as all the specimens I have seen, unless greatly abraded, are setose beneath (the setæ, however, often almost hidden) and on the legs, this character may also be dismissed.

C. ALBISPARSUS.—No character is mentioned in the description or tabulation that is worth consideration; Pascoe's specimen was evidently partially abraded.

C. CARBO.—“The round prominent eye and the form of the prothorax afford a very trenchant diagnosis of this species. My specimen is probably somewhat worn, as the scales are unsym-

metrically scattered on the two sides; except under a powerful lens, it appears to be almost glabrous." The form of the eye, if constant, would certainly be a good character, but this is not the case (see notes under "other variations"). There does not appear to be anything special about the prothorax, as it is described as "rather narrow, rounded at the sides, contracted at the base, which is very little broader than the apex, irregularly tuberculate above"; these remarks would apply to many specimens in my possession. Pascoe himself admits that his specimen was worn, and I certainly think it unjustifiable to define a new species in a difficult genus from a battered unique specimen.

C. CICATRICOSUS.—Pascoe appears to think that the specimens he described were worthy of specific rank principally on account of—"Elytra . . . between the posthumeral and median spines with a large raised glabrous bifid scar-like mark." This is an occasional variation that one might expect in almost any insect with elytra striate and subtuberculate like the species of *Catasarcus*. I have observed its occurrence in specimens of *Sclerorrhinus*, *Cubicorrhynchus*, *Eurhynchus*, *Poropterus*, *Mythites*, *Oxyops*, *Haplonyx*, *Leptops*, *Prypnus*, *Aterpus*, &c. In some species of *Tenebrionidæ* it is of frequent occurrence.

C. SCORDALIS and C. ERICIUS.—The characters given in the tabulation for these supposed species show on what slight grounds some entomologists can erect a species. I can find nothing in Pascoe's descriptions and remarks needing comment

SECTION i.

In this section there certainly are a number of good species, but the strongest feature of all—the *thickness* of the exoskeleton—has been entirely overlooked by Mr. Pascoe. In some species it is extremely hard and it is only with great difficulty that a strong pin can be forced through; in other species, specimens may be readily impaled with the finest pin. As Pascoe, however, probably received his specimens pinned, this oversight is excusable. I think that the number of his

species will have to be reduced, but this is a work that should be done by an entomologist having access to his types.

Subfamily GONIPTERIDES.

Oxyops as a genus is not very distinct from *Gonipterus*, the principal differences being that in *Oxyops* the metasternum is produced between the anterior coxæ, while in *Gonipterus* the elytra have a more or less conical posthumeral tubercle. But there are many intermediate forms; still, as the species are numerous, it is perhaps advisable to retain both names. *Syarbis* is sufficiently distinct on account of its clawless tarsi and more elongate form, but one species here described (*S. simulans*) has all the appearance of *O. uniformis*. The right of *Pantorëites* to a place in the subfamily seems doubtful.

OXYOPS UNIFORMIS, n.sp.

♂. Piceous-brown, antennæ—club excepted—reddish. Above clothed with dingy brown scales, denser and longer on prothorax, down the middle of which a pale stripe is formed and continued on to scutellum; a few pale scales about apex of elytra, especially on suture and sides of posterior declivity; under surface with denser, longer and paler scales than upper.

Head feebly granulate and punctate, an impression between eyes which is continued on to rostrum; eyes large, almost round; rostrum as long as head, base coarsely punctate, apex widened, shining and almost smooth, 1st joint of funicle a little longer than 2nd. *Prothorax* feebly transverse, granules small. *Elytra* almost equally convex throughout, parallel-sided to near apex; punctate-striate, punctures large, round, smaller towards apex; interstices narrow, convex, nowhere suddenly elevated; shoulders feebly rounded; apex submucronate. *Mesosternal process* slightly produced. Base of *abdomen* depressed. *Legs* rather stout; tibial teeth small, almost obscured by setose scales; claw-joint rather small. Length $5\frac{1}{4}$, width $2\frac{1}{2}$ mm.

♀. Differs in being larger (6 mm.), rostrum shorter, broader and more evenly punctate throughout; and the eye smaller.

Hab.—N.S.W.: Tamworth; a pair taken *in cop*.

A small dingy species entirely without tuberosities and with a much smaller claw-joint than usual; at first sight it might readily be mistaken for a species of *Syarbis*. From the description of *O. arcatus* it differs in the colour of its scales and in the interstices. From the description of *G. turbidus* in the head not profoundly excavated between eyes, length of rostrum, &c.

OXYOPS MULTIDENTATA, n.sp.

Entirely dull red. Upper surface with straw-coloured scales, sparse on head except about eyes; on prothorax only noticeable under a lens; scutellum densely covered; moderately dense on elytra but having three almost bare patches, a transverse one near base widening to suture, a subbilunulate one about middle, and an irregular patch on posterior declivity. Under surface densely clothed with rather elongate spatulate scales, paler on abdomen than on sterna; gullet with elliptic closely adpressed scales.

Head noticeably punctate, a deep elongate impression between eyes; eye large, prominent, almost round. Rostrum short, thick, at apex fully as wide as base of head; densely punctate, carinate from ocular impression to insertion of antennæ. First joint of funicle about half the length of 2nd, obtriangular, 1st and 2nd combined longer than scape; club paler than apical joints of funicle. *Prothorax* densely and coarsely punctate, a feeble median carina on basal two-thirds, apex constricted. *Scutellum* suboblong, punctate, not at all raised. *Elytra* gradually decreasing in width to apex; striate-punctate, punctures large, oblong, decreasing towards apex and sides, ten rows in all; interstices convex, granulate; near suture narrower, near sides wider than punctures, 3rd raised throughout, but more noticeably at base; shoulders oblique, scarcely outwardly prominent. Under surface densely punctate. *Abdomen* flattened at base; intermediate segments bare in the middle, with the sutures there suddenly enlarged. *Metasternum* with a distinctly triangular and granulate coxal process. *Mesosternal process* rather short, triangular and distinctly pointed. *Femora* feebly notched near apex; four

anterior tibiæ strongly curved, the anterior with about fourteen, intermediate with about ten, posterior with about eight small triangular black-tipped teeth; claw joint long, squamose. Length $7\frac{1}{2}$, width $3\frac{3}{4}$ mm.

Hab.—King's Sound (Mr. W. W. Froggatt).

The tibiæ in this species are even more noticeably curved than in *O. Mastersi*; the teeth are somewhat irregular in size and position, especially towards the apex. My specimen is perhaps somewhat abraded, nevertheless the species should be easily identifiable on account of the absence of tubercles, median carina, thick rostrum, pale club, and tibiæ.

OXYOPS SERRICOLLIS, n.sp.

♀. Piceous-black; legs and antennæ dull red, claws and club piceous.

Head punctate at base, a narrow longitudinal impression from between eyes to base, a shining impunctate space from impression to insertion of antennæ, at the sides of which are rather large punctures. Funicle with 1st joint obtriangular, about half the length of 2nd, 2nd almost as long as scape, 3rd-5th elongate, 6th-7th subglobular but not transverse; club elongate. *Prothorax* with strong granules or small tubercles, conical, larger and more regular at sides, forming a double irregular oblique row on each side of middle, the rows expanding and becoming less noticeable towards base; a shining interrupted carina continuous almost from apex to base. *Scutellum* long, narrow, densely punctate. *Elytra* broad, strongly convex; densely granulate, the granules larger and more irregular at base, becoming obsolete towards apex; striate-punctate, punctures large, deep, either oblong, quadrate or round; interstices rather narrow, convex, 3rd, 5th, 7th and 9th slightly raised throughout, 3rd and 7th (shoulder) distinctly cristate at base, 5th and 9th slightly so; apices separated but not mucronate. *Abdomen* with depressed almost obsolete granules. *Metasternum* with distinct granules, coxal process short, triangular. *Mesosternal process* distinctly produced. *Legs* granulate-punctate; anterior tibiæ curved at apex, teeth irregular

and not very numerous; claw-joint moderately long, squamose, claws feeble. Length 10, width $5\frac{1}{2}$ mm.

Hab.—Coolgardie (Mr. C. A. White).

My unique specimen is certainly abraded, but is nevertheless very distinct. It is heavily built, with large granules, not one of the funicular joints transverse, distinctly granulate under surface; but in particular by the shining impunctate space between muzzle and eyes. In all the other species of the subfamily I have examined, this space is densely and usually very coarsely punctate, and is often ridged or costate; in the present species it is not at all raised. The scales appear to be densest on prothorax along median line, on head about eyes, and on elytra (where they are perhaps fasciculate) towards apex, and are of various colours, the larger being snowy-white and the smaller dingy brown. In my specimen the pygidium is exposed, and is seen to be covered, except down the middle, with dense white setæ.

OXYOPS MODESTA, n.sp.

Head (muzzle excepted) black, prothorax piceous, elytra and legs piceous-red, antennæ dull red. Covered with rather long whitish scales, densest on head, especially between eyes and base of rostrum; forming three lines on prothorax, the central one rather distinct, the two outer somewhat obscure, a scale in each puncture elsewhere; scutellum rather densely clothed; elytra with a feeble transverse fascia behind the middle, from there to apex and at base more densely squamose (but still sparingly) than elsewhere; under surface with longer, paler and denser scales than above.

Head densely punctate at base; a narrow longitudinal impression between eyes; eyes large, almost round, scarcely prominent. Rostrum longer than head, equally widening to apex, base densely and coarsely punctate, a narrow costa from ocular impression to insertion of antennæ. Funicle with first joint obtriangular, as long as 3rd, 2nd almost as long as scape, 6th-7th globular. *Prothorax* densely granulate-punctate; constricted near apex, base feebly bisinuate. *Scutellum* densely punctate, triangular. *Elytra*

not much wider than prothorax; minutely granulate throughout; striate-punctate, punctures rather large, subquadrate; interstices wide, very feebly convex, 3rd and 4th slightly thickened at base, the thickening noticeable only under a lens; apex very feebly mucronate. *Metasternum* with almost obsolete coxal processes. *Mesosternal process* produced and rounded. *Tibiæ* almost straight, many small teeth almost concealed by pubescence, apex edged with black setæ; claw-joint rather long, squamose. Length $8\frac{1}{2}$, width 4 mm.

Hab.—N.S.W.: Mt. Kosciusko (Mr. W. E. Raymond).

A sober-coloured species without elytral tuberosities. From *O. australis*, which it somewhat resembles in structure, it differs besides colour and clothing in having the elytral punctures smaller, the interstices wider, shoulders more rounded, prothorax without median carina, tibiæ without noticeable granules, in the funicle, &c.

OXYOPS ABERRANS, n.sp.

Upper surface uniformly dull red, beneath slightly tinged with piceous. Head with pale ochreous scales, densest at base between and around eyes; prothorax with sparse ochreous scales, and three distinct longitudinal vittæ composed of large white scales, one median and two lateral, there are also two very feeble vittæ between middle and sides; scutellum with dense white scales; elytra with sparse pale ochreous scales, sides with a longitudinal stripe of large white scales having in some lights a pearly iridescence, suture with pale scales denser towards scutellum where they are almost snowy-white, 3rd interstice with a stripe of pale scales at base, and two small whitish fascicles, one at middle and one a little beyond it, 5th interstice with several patches of pale scales, the most noticeable one shortly before apex. Under surface with short ovate and elongate scales, varying in colour from white to ochreous and dull brown.

Head punctate, a feeble impression between eyes; eyes transversely elliptic, rather small. Rostrum densely punctate, punctures coarser at base, feebly widening to apex, without carina. First joint of funicle obtriangular, fully as long as 2nd, 2nd

scarcely as long as 3rd-4th combined, 5th-7th globular. *Prothorax* with moderately large honeycomb-like punctures, apex not suddenly constricted, base feebly bisinuate. *Scutellum* scarcely longer than wide. *Elytra* wide, nowhere depressed; minutely and irregularly granulate throughout; striate-punctate, punctures moderately large but much obscured by granules; interstices as wide or wider than punctures, very feebly convex, 3rd scarcely raised at base, 5th with a small tubercle near apex; shoulders oblique, outwardly prominent. Coxal processes of *metasternum* distinct when viewed sideways, appearing obsolete from above. *Mesosternal process* feebly produced and rounded. *Femora* almost without apical notch; anterior tibiae distinctly curved, with numerous small and sufficiently distinct teeth which are directed backwards; claw-joint long, squamose. Length 5, width $2\frac{2}{3}$ mm.

Hab.—Swan River: two specimens obtained by sweeping (Lea); Mt. Barker (Mr. R. Helms); King George's Sound (Mr. G. Masters).

A very distinct species, at first sight somewhat resembling *Syarbis sublineatus*. It is robust and rather prettily marked, and when alive specimens are covered to a slight extent with an ochreous exudation. From all the described species of the genus it may be distinguished by its anterior tibiae with their teeth directed backwards, the short 2nd joint of funicle, and the laterally projecting shoulders. The male is slightly smaller, and with a shorter and broader rostrum than female.

OXYOPS MASTERSI, Pasc. (Mast. Cat. Sp. No. 4989).—I have five specimens of this species, in all of which the anterior tibiae are strongly curved, so that this character would not appear to be a sexual one as suspected by Mr. Pascoe. The prothorax appears to be tricarinate, but a brief examination will suffice to show that there is but a median carina, on each side of which is an oblique row of raised tubercles or granules, partially concealed by scales. In several specimens the 2nd, 3rd, 5th, and 7th interstices are about equally raised.

OXYOPS FARINOSA, Pasc. (Mast. Cat. Sp. No. 4981).—Perfectly fresh specimens of this species are densely covered with a pinkish

mealy substance, almost entirely concealing the granules and punctures; if placed in spirits for a short period this substance turns to a dirty yellow colour, and is almost confined to the punctures; with prolonged immersion it disappears entirely. A pair taken *in cop.* had this substance entirely pale ochreous, but pink is the usual colour. The tibiae are densely clothed with white decumbent setae, and are entirely without the numerous small teeth so common in the subfamily; others of the larger species, however, are without or have extremely small teeth.

O. NIVEOSPARGA, Pasc.; *l.c.* 4992. *Hab.*—Galston, Cootamundra, N.S.W.

O. EXCAVATA, Boisd.; *l.c.* 4980. *Hab.*—Queanbeyan, N.S.W.

O. FASCIATA, Boisd.; *l.c.* 4982. *Hab.*—New South Wales, Queensland, Victoria, Tasmania, South and West Australia.

O. SQUAMULOSA, Bohem.; *l.c.* 4997. *Hab.*—Tamworth, N.S.W.

O. IRRASA, Pasc.; *l.c.* 4987. *Hab.*—Sydney, N.S.W.

O. BILUNARIS, Pasc.; *l.c.* 4974. *Hab.*—Glen Innes, N.S.W.

O. CANCELLATA, Bohem.; *l.c.* 4976. *Hab.*—Loftus, Sydney, Como, N.S.W.

O. CRASSIROSTRIS, Pasc.; *l.c.* 4979. This species appears erroneously in the Catalogue as *crassicornis*.

GONIPTERUS GEMINATUS, n.sp.

Piceous, antennae dull red. Upper surface equally clothed with whitish moderately elongate scales, somewhat obscured in the middle of prothorax, at the sides of which they form scarcely traceable vittae; under surface much more densely clothed than upper.

Head convex, granulate, a feeble impression between eyes; eyes feebly elliptic. Rostrum as long as head, stout, parallel-sided, densely granulate, the granules apparently arranged in rows. First joint of funicle obtriangular, almost transverse, not half the length of 2nd, 1st-2nd as long as scape, none of the joints transverse. *Prothorax* densely granulate, the granules shining; an almost obsolete median carina; sides feebly but noticeably bisinuate; base rather deeply bisinuate. *Scutellum* oblong, granulate,

raised. *Elytra* subtriangular, minutely granulate throughout; striate-punctate, punctures moderately large but much obscured by granules and scales, each containing a rather large pale scale; interstices as wide or wider than punctures, scarcely convex, 3rd and 5th raised and cristate at base; posthumeral tubercle blunt and almost obsolete. *Abdomen* depressed along the middle, granulate. *Metasternum* with a longitudinal granulate ridge or elongate tubercle on each side of the middle; coxal processes large, very distinct when viewed from the sides. *Legs* granulate; four anterior tibiæ noticeably curved, the anterior with strong teeth towards apex and smaller ones towards base, intermediate with smaller teeth, posterior with larger and more regular teeth than intermediates; claw-joint moderately long, but not projecting much beyond pad of 3rd. Length $8\frac{1}{2}$, width $4\frac{1}{4}$ mm.

Hab.—N.S.W.: Tamworth.

The ridges on the metasternum are, I believe, unique in the subfamily.

GONIPTERUS EXCAVIFRONS, n.sp.

Piceous-brown, legs piceous-red, antennæ dull red. Head and prothorax with whitish scales somewhat obscured by ochreous dust, eyes completely margined; on the prothorax there is a median dull vitta enlarging to base, the sides with larger and purer scales; elytra with rather small scales denser towards apex and sides, disc towards base and about middle partially nude; under surface with dense, snowy scales.

Head granulate. *Rostrum* granulate, with a triangular excavation having its base between antennæ, and apex between eyes, in some specimens the base supplied with a Δ -shaped ridge. First joint of funicle a little more than half the length of 2nd, 1st-2nd scarcely the length of scape; club elongate. *Prothorax* subtubular, granulate; a trace of a feeble median carina. *Scutellum* narrow, oblong, punctate. *Elytra* almost parallel-sided to near apex; shoulders square; posthumeral tubercle entirely absent; apex feebly mucronate; transversely granulate; striate-punctate, punctures large, oblong, partially concealed by scales and granules; interstices as wide or wider than punctures, scarcely convex,

from 3rd to 7th raised at base, 3rd, 5th and 7th more noticeably than the others. *Coxal processes* granulate, very distinct when laterally viewed. Anterior *coxæ* slightly curved, all with many small, partially hidden teeth; claw-joint moderately projecting. Length $9\frac{1}{2}$, width $4\frac{1}{3}$ mm.

Hab.—N.S.W.: Hillgrove (Dr. C. Hardcastle).

The largely excavated rostrum, parallel elytra and absence of posthumeral tubercles are diagnostic of this species. The mesosternum is not at all produced between the *coxæ*, and it certainly looks more at home in *Gonipterus* than it would in *Oxyops*.

GONIPTERUS PULVERULENTUS, n.sp.

Derm evidently of a dull deep red, legs and antennæ dull red. Upper surface and scales almost completely concealed by a dark chocolate exudation or dust; head with regular small white scales showing, and apparently elongate scales at base of rostrum; elytra with an oblique patch of white scales on each side, its apex directed forward, the scales almost hidden by testaceous dust; apex of elytra with a few whitish scales showing; under surface with dense elongate white scales, mixed at the sides with reddish dust and feebly tinged with yellow in the middle; legs and even tarsal pads with reddish dust.

Head depressed immediately behind eyes; eyes large, almost round. Rostrum excavated, carinate, parallel-sided, granulate. First joint of funicle half the length of 2nd, 1st-2nd shorter than scape, 5th-7th globular, feebly transverse. *Prothorax* densely granulate, base trisinate, apparently without median carina. *Scutellum* oblong, feebly raised. *Elytra* subtriangular, conjointly rounded; shoulders almost square; posthumeral tubercle distinct; apex rounded; punctate-striate, punctures oblong, traceable only towards middle and sides, but evidently large; interstices granulate, 3rd and 5th distinctly raised at base. Coxal processes of *metasternum* very distinct. Anterior *tibiæ* curved, with five distinct recurved teeth. Length 8, width $3\frac{3}{4}$ mm.

Hab.—N.S.W.: Tarago.

Fresh specimens of this species should be easily identifiable. As my specimen is perfect and the only one I possess, though I have collected others, I do not care to immerse it in spirits to remove the thick dust with which it is covered, but I think that the oblique white patch of scales on the elytra should render spirit specimens sufficiently distinct.

GONIPTERUS XANTHORRHOÆ, n.sp.

Of a dull deep red, elytra, legs and antennæ dull red. Above densely clothed with whitish scales densest on elytra, especially towards apex; covered with a brickdust-coloured exudation almost completely filling punctures and giving scales, to the naked eye, a slightly ferruginous tint; under surface, especially abdomen, with dense white scales, mixed with dust at the sides.

Head granulate, an impression between bases of eyes continued on to basal half of rostrum; eyes large, almost circular, margined with scales. First joint of funicle thick, half the length of 2nd, 1st 2nd longer than scape, 4th-7th pear-shaped, not at all transverse; club elongate. Rostrum broad, feebly widening to apex; granulate and punctate and apparently without costæ. *Prothorax* subtubular, feebly constricted in front; base trisinuate; no median carina; with small, piceous, shining granules. *Scutellum* elongate, narrowing to and rounded at apex, slightly raised. *Elytra* subtriangular; feebly granulate; almost twice the width of prothorax; strongly convex; striate-punctate, punctures disappearing towards apex, at middle and sides quadrate or oblong, large but somewhat obscured by scales; interstices wide, scarcely convex, 3rd distinctly, 5th feebly raised and cristate at base; shoulders square, laterally projecting; posthumeral tubercle small, moderately sharp; apex mucronate. *Abdomen* flattened in the middle. Coxal process of *metasternum* triangular, very distinct from the sides. *Legs* stout; four anterior tibiæ feebly curved, the anterior with six strong pale teeth, posterior with seven still stronger teeth, intermediate with about seven small teeth. Length 10, width $4\frac{3}{4}$ mm.

Hab.—N.S.W.: Galston (Dumbrell and Lea). On *Xanthorrhoea*.

A peculiar-looking species, not close to any with which I am acquainted except the following.

GONIPTERUS CRASSIPES, n.sp.

Piceous, tarsi and antennæ dull red. Scales as in the preceding except that they are sparser and smaller above and less dusty; on the under surface the scales are longer, not quite as dense and the dust more evenly and thickly distributed.

Head granulate and punctate, a fovea between eyes; eyes as in preceding. *Rostrum* granulate and punctate, feebly widening to apex; basal half with a shallow feebly costate triangular impression, ridged at sides, the ridges terminating at ocular fovea. *Scape* elongate, obtriangular, 1st joint of funicle subtransverse not half the length of 2nd, 2nd as long as 3rd-4th combined, 3rd not elongate, 4th-7th subglobular. *Prothorax* granulate, bisinuate at base, constricted near apex; a feeble median carina on each side of which is an irregular depression. *Scutellum* slightly raised, shaped somewhat like an acorn. *Elytra* granulate throughout; broad, subtriangular, strongly convex; apex minutely mucronate; posthumeral tubercle large, distinct; striae-punctate, punctures narrow, deep, oblong; interstices wide, feebly convex, 3rd with a large tubercle near base, 5th with a much smaller one; shoulder tuberculate, squarish, not outwardly projecting. *Under surface* and *legs* granulate. *Abdomen* depressed along middle. Coxal processes of *metasternum* large, triangular, distinct. *Legs* much thicker than is usual in the genus; four anterior tibiae curved, anterior with six moderately strong teeth, intermediate with seven, posterior with five teeth which are stronger than the anterior; claw-joint slightly projecting, densely pilose. Length 10, width $5\frac{1}{2}$ mm.

Hab.—N.S.W.: Braidwood.

In appearance close to preceding, but from it abundantly distinct. The large basal tubercles of elytra, very thick legs, 2nd funicular joint not elongate, and large posthumeral tubercle render it very distinct. In my unique specimen there is an

appearance of an oblique dark fascia from about the middle to the sides a little before apex.

GONIPTERUS CITROPHAGUS, n.sp.

Piceous-black; antennæ obscure red; elytra piceous at base, dull red elsewhere. Head and rostrum densely clothed with long pale straw-coloured scales; prothorax with a broad median vitta of scales as on head, the sides more sparingly clothed; scutellum densely squamose; elytra with a most irregular obscure sutural stripe of pale scales widening to apex and never exactly the same (in ten specimens under examination), sides with slightly darker and smaller scales, here and there traversed by a few scales as on suture; punctures filled with an ochreous dust; under surface densely clothed with shining white scales.

Head apparently granulate, with an excavation commencing between bases of eyes and continued on to rostrum; eyes large, prominent, elliptic-ovate. Rostrum thick, longer than head, granulate. Antennæ short; scape short, thick, obtriangular; 1st joint of funicle transverse, more than half the length of 2nd, 2nd feebly widening to apex, 1st-2nd as long as or longer than scape, 3rd not elongate, 4th 7th transverse.* *Prothorax* granulate, sides very feebly bisinuate, base trisinuate. *Scutellum* granulate, elongate, slightly raised, shaped somewhat like an acorn. *Elytra* granulate, about once and one-third the width of prothorax; apex very feebly emarginate, not mucronate; striate-punctate, punctures moderately large, oblong, distinct to apex; interstices wide, flat, 3rd raised and cristate at base, 5th less noticeably so; shoulders oblique; posthumeral tubercle small, rather sharp. Coxal processes of *metasternum* rather more acute than is usual. Tibiæ with a few rather large teeth, four anterior feebly curved. Length $7\frac{1}{2}$, width $3\frac{2}{3}$ mm.

Hab.—Swan River. Taken from the bases of orange leaves, many of which had been partially eaten.

* Including the setæ with which they are clothed.

A dingy species having the apex of the elytra feebly mottled; there is a very irregular, bilobed naked ring immediately behind the middle of the suture in most of my specimens; the shape and length of the funicular joints are this species' strongest features; the eyes are less round than is usual.

I have four specimens from Perth which have been in spirits for some time and which apparently belong to this species. On them there is a feeble median prothoracic carina and no median vitta, the sutural stripe is absent, the scales on the elytra being evenly distributed, except for small naked patches, and arranged about five deep on each interstice. The sexual differences are very slight (I have a pair taken *in cop.*); in ♂ the rostrum is irregular in the middle, in ♀ it is obsoletely costate; ♂ also has a slightly larger and thicker posthumeral tubercle.

GONIPTERUS CIONOIDES, Pasc. (Mast. Cat. Sp. No. 5021).—This very pretty little species is extremely abundant on some low-growing shrubs about Sydney and Galstön; nevertheless it is seldom beaten into the umbrella or sheet on account of its clinging habits. On one plant alone I have seen several hundreds of specimens.

GONIPTERUS RETICULATUS, Boisd. (Mast. Cat. Sp. No. 5028).—The description of this species is truly Boisduvallian, being simply: "*Niger, thorace rugoso, elytris cancellatis.*" Nevertheless out of about sixty species of the subfamily I know, this description will fit but *Oxyops cancellata*, Bohem.

G. EXARATUS, Farhs.; *l.c.* 5022. *Hab.*—Tasmania (Mr. A. Simson).

G. SCUTELLATUS, Gyll.; *l.c.* 5029. *Hab.*—Tasmania (Mr. A. Simson).

G. GIBBERUS, Boisd.; *l.c.* 5024. *Hab.*—Clarence River.

G. SUTURALIS, Gyll.; *l.c.* 5031. *Hab.*—Burrawang, N.S.W. (Mr. T. G. Sloane).

BRYACHUS SQUAMICOLLIS, Pasc. (Mast. Cat. Sp. No. 5017).—I have this species from all the Australian Colonies except Tasmania. It is somewhat variable as regards the colour and density of its scales, and, to a less extent, the colour of the derm.

SYARBIS FASCICULATISSIMUS, n.sp.

Red; prothorax with a piceous tinge; elytra slightly tinged with piceous beyond the middle. Head with pale scales, eyes margined, between eyes subbifasciculate; prothorax with a pale median and a basal vitta; a transverse row of four erect straw-coloured fascicles; apex feebly bifasciculate; scutellum densely squamose; elytra with numerous (over thirty) erect fascicles as on prothorax, those towards sides and apex slightly paler and smaller, those on the 3rd and 5th interstices slightly larger; under surface moderately densely clothed with whitish scales.

Head constricted behind eyes, a small (apparently) fovea between them; eyes elliptic, strongly transverse. *Rostrum* longer than head, punctate, widening to apex. *Antennæ* short, thick, all the joints of funicle transverse; club very short. *Prothorax* cylindrical, distinctly longer than wide; base bisinuate; with large, round, regular punctures. *Scutellum* oblong, apex slightly wider than base. *Elytra* parallel-sided, almost twice the width of prothorax; shoulders slightly oblique; seriate-punctate, punctures large, round, shallow, approximate; interstices irregular, scarcely raised; apex with a feeble triangular emargination. *Legs* moderately long; tibiae straight, with a number of small teeth towards their apices. Length $5\frac{3}{4}$, width $2\frac{1}{2}$ mm.

Hab.—King's Sound (Mr. W. W. Froggatt).

This is the only recorded species having fasciculate elytra and prothorax. The fascicles are usually perfectly erect, and composed of from ten to twenty or thirty straw-coloured and thin scales. I do not think it necessary to erect a new genus for it, as its three-jointed tarsi and most of its structural features are those of *Syarbis*. It has a more parallel outline and longer prothorax than any other species in the subfamily I am acquainted with.

SYARBIS ALCYONE, n.sp.

Dull brownish-red; head tinged with piceous; under surface (especially of abdomen) paler than upper. Head with small rounded pale scales, denser about eyes and basal sides of rostrum

than elsewhere; small round pale scales forming a narrow longitudinal vitta on prothorax and bordering its sides, covering scutellum, forming a narrow sutural stripe on elytra and margining their sides; each puncture with a small dingy scale; under surface with moderately dense, suboval, white scales.

Head feebly convex; a small ocular fovea continued as a narrow depression on to apical part of rostrum; eyes transversely elliptic; not at all prominent. *Antennæ* short, thick. *Rostrum* longer than head, feebly decreasing to apex. *Prothorax* distinctly transverse, narrowing to apex, base bisinuate; with regular, moderately large, shallow punctures. *Scutellum* subtriangular. *Elytra* about once and one-half wider than prothorax; feebly decreasing to near apex; seriate-punctate, punctures moderately large, regular, shallow, round, about nine rows on each elytron; interstices wider than punctures, scarcely convex. Apical segment of *abdomen* more widely impressed than usual. *Legs* stout; tibiae short, each with about five small teeth. Length $4\frac{3}{4}$, width 2 mm.

Hab.—Tasmania (Mr. A. Simson, No. 3366).

I have three specimens from Mr. Simson, one smaller and one larger than the type. The narrow line continuous from head to apex of elytra, with the lateral markings of prothorax and elytra should render this species distinct. It is the first of the genus to be recorded from Tasmania.

SYARBIS PLUMBEUS, n.sp.

Narrow, subopaque. Piceous, antennæ dull red; upper surface, and to a certain extent, under surface and legs with a dull leaden appearance. Head not very densely squamose, scales dirty grey; prothorax with dingy scales in punctures and others irregularly distributed, and forming a feeble median and two lateral lines; elytra feebly squamose, a few scales about apex and sides, and a moderately distinct oblique stripe behind middle. Under surface and legs rather densely squamose, scales paler than above.

Head with an impressed line down middle; eyes transversely elliptic. *Rostrum* thick, irregular, shorter than head, anterior portion depressed. *Prothorax* slightly longer than wide, sides

almost straight, feebly increasing to base; not very densely, and irregularly punctate. *Scutellum* small, rounded, depressed. *Elytra* about twice the width and a little more than twice the length of prothorax; each with ten rows of moderately large, round, and rather deep punctures, larger than those of prothorax; interstices wider than punctures, scarcely raised; near base with a callosity larger than on shoulder and common to 3rd, 4th, and 5th interstices, seen from above apparently situate on 4th. *Legs* moderately thick; tibiae feebly curved, with numerous small teeth beneath. Length $4\frac{1}{2}$, width 2 mm.

Hab.—New South Wales (Mr. G. Masters).

A small, narrow, dirty-looking species, the peculiar leaden appearance of which is certainly not due to abrasion, nor is it caused by scales or pollinosity, but appears to be more of the nature of a dull varnish.

SYARBIS PULCHRIPENNIS, n.sp.

Reddish-brown, shining; sterna tinged with piceous; elytra with paler markings, consisting of a transverse fascia near base, continued along suture and narrowly opening out towards apex. With small greyish scales rather densely covering head and rostrum, and feebly distributed on prothorax and elytra; each puncture containing a large scale. Under surface and legs rather densely squamose, scales sometimes tinged with ochreous; tibiae almost ciliate beneath.

Head with an impressed line down middle and in front of eyes; densely punctate; eyes transversely elliptic. Rostrum thick, swollen in middle, longer than head, densely punctate. Antennae short, club briefly pyriform. *Prothorax* longer than wide, sides straight, feebly decreasing to base; rather densely and regularly punctate, punctures large, round, shallow. *Scutellum* slightly depressed, elliptic. *Elytra* about once and one-half the width of prothorax and not thrice its length; feebly decreasing to near apex; apex feebly emarginate; each with ten rows of punctures on prothorax; interstices very slightly raised, 4th with a distinct callosity (but smaller than that on shoulder) near base. *Legs*

(for the genus) rather long; tibiæ almost straight, the anterior with numerous small teeth beneath, intermediate with three, posterior with two. Length $6\frac{1}{2}$, width $2\frac{3}{4}$ mm.

Hab.—N.W. Australia (Macleay Museum).

Somewhat resembles *sciurus*, but may be distinguished by its considerably larger size, less parallel-sided and differently coloured elytra, longer legs, and the callosity on 4th interstice.

SYARBIS SIMULANS, n.sp.

Short, broad, less convex than usual. Black or dark red? Densely covered with a muddy ochreous pollinosity, and apparently rather densely clothed with small whitish scales which become moderately elongate on under surface.

Head with a feebly impressed line; eyes comparatively large, transversely elliptic. *Rostrum* thick, subparallel, longer than head. *Prothorax* scarcely transverse, sides almost straight, base considerably wider than apex; densely granulate and punctate, apparently with a raised median line. *Scutellum* elongate, elliptic. *Elytra* considerably wider than prothorax and not thrice its length, shoulders oblique; each with ten rows of deep, round and rather large, partially concealed punctures; interstices apparently wider than punctures and slightly rounded; no discal callosity; sides slightly thickened at about the position of the posthumeral tubercle in *Gonipterus*. *Mesosternum* produced between coxæ almost as in *Oxyops*. *Legs* rather short and thick; tibiæ with numerous small teeth beneath. Length 6. width 3 mm.

Hab.—New South Wales (Mr. G. Masters).

A very interesting species, strongly resembling *O. uniformis* (*ante*), agreeing in many respects with the smaller species of *Oxyops*, but with the clawless tarsi of *Syarbis* (under a powerful lens there appears to be a rudimentary claw-joint embedded in the 3rd joint of the posterior tarsi). It is the only pollinose species I am acquainted with in the genus; the exudation is so dense as to entirely conceal the derm and hide the finer details of its sculpture.

S. PACHYPUS, Pasc.; Mast. Cat. Sp. No. 5012. *Hab.*—Loftus, N.S.W.

S. NERVOSUS, Pasc.; *l.c.* 5009. *Hab.*—Sydney.

S. SEMILINEATUS, Pasc.; *l.c.* 5015. *Hab.*—Swan River, Mt. Barker, Albany.

S. GONIPTEROIDES, Pasc.; *l.c.* 5007. *Hab.*—Swan River.

S. SCIURUS, Pasc.; *l.c.* 5014. *Hab.*—N.W. Australia (Macleay Museum).

S. HAAGI, Roel.; *l.c.* 5008. *Hab.*—Gayndah, Endeavour River (Mr. G. Masters).

S. NIGER, Roel.; *l.c.* 5010. *Hab.*—N.S.W. (Mr. G. Masters).

PANTOREITES MICANS, n.sp.

Elongate-elliptic, shining. Red, in places tinged with piceous. Densely squamose, head uniformly clothed with whitish scales; prothorax and elytra with five continuous stripes, the middle and two lateral ones of glittering silvery scales, the two inner stripes of somewhat ochreous and dull scales. Under surface and legs with dense glittering scales, becoming subsetose on apical segment of abdomen and beneath tibiae.

Head convex, punctate, no visible ocular fovea; eyes slightly oblique, almost round. Rostrum slightly longer than head, parallel-sided, densely punctate. *Prothorax* slightly transverse, widening to base; posterior angles rather acute; densely punctate, punctures concealed. *Scutellum* small, suboblong, apex rounded. *Elytra* not much wider than prothorax and about four times its length; shoulders oblique; sides feebly decreasing from near base to apex; seriate-punctate, punctures large, almost concealed, wider than interstices. *Legs* moderately long; tibiae, especially the four anterior, curved, dentate beneath; claw-joint curved, longer than three basal joints combined. Length $5\frac{1}{2}$, width 2 mm.

Hab.—Swan River.

The scales in the middle of the prothorax form a parallel-sided and rather broad stripe, and are more shining than elsewhere, those at the sides being comparatively dull. On the elytra the

lateral stripes are not quite continuous to the apex, the ochreous scales being continued on the outer margin. There are no nude spaces between the stripes, but here and there nude punctures (abraded ?) may be seen.

At first sight this species resembles *scenicus*, but it may be at once distinguished by its larger size, glittering scales (on the prothorax of *scenicus* there are seven stripes of which the three white ones are small; in *micans* the white scales occupy more than half the surface), but in particular by the width of prothorax, in *scenicus* the base being scarcely wider than the apex, and distinctly much narrower than the base of elytra.

PANTOREITES ILLUMINATUS, n.sp.

Dull red, claws and tibial teeth piceous. Head feebly squamose on vertex, the scales all converging to centre; sides, between eyes and base of rostrum, with small dense snowy scales; prothorax with three distinct longitudinal snowy vittæ scarcely reaching apex, the median widening to near base, sides similarly clothed; scutellum densely squamose; elytra with small, subquadrate, snowy scales, densely covering suture and to a less extent, but still densely, the sides; from the middle to near apex a subtriangular space sparsely clothed (except along suture) towards its apex and almost nude at base, near scutellum sparsely clothed; interstices slightly interrupting continuity of scales; under surface rather more densely squamose than upper, the scales more elongate and of a less pure white than above, except on sides of sterna, where they are densest of all.

Head convex, punctate, a puncture between eyes; eyes transversely ovate, moderately large. Rostrum shorter than head, subparallel, punctate, a feeble irregular ridge between antennæ. Scape slightly curved; three basal joints of funicle moderately elongate, 4th triangular, 5th-7th globular. *Prothorax* almost cylindrical, densely punctate, each puncture bearing a small scale; a feeble carina only noticeable at base. *Scutellum* small, oblong. *Elytra* about once and one-half the width of prothorax, feebly decreasing to apex; shoulders slightly oblique; seriate-punctate,

punctures moderately large, subquadrate; interstices flat, twice the width of punctures. *Legs* rather long; femora thickened; tibiae, especially the anterior four, strongly curved, all with a number of moderately strong recurved teeth, those on the intermediate pair sparser and feebler than on the others; claw-joint strongly curved, longer than three basal joints combined. Length 5, width 2 (vix) mm.

Hab.—Tasmania: Davenport (Mr. A. Simson).

I have three specimens, two of which are smaller and less perfect than the type; in one of them the antennae are almost piceous. The scales along the suture might stand for a candle of which the median prothoracic vitta would do for the flame and the basal carina the wick, the resemblance being perfect. The tibiae are more strongly curved and the claw-joint is longer than in *vittatus* or *scenicus*; the prothorax is also narrower in proportion.

P. VITTATUS, Pasc.; Mast. Cat. Sp. No. 5004. *Hab.*—Sydney.

P. SCENICUS, Pasc.; l.c. 5002. *Hab.*—Gosford.

P. VIRGATUS, Pasc.; l.c. 5003. *Hab.*—Swan River.

Subfamily DIABATHRARIIDES.

STRONGYLORRHINUS OCHRACEUS, Schön. (Mast. Cat. Sp. No. 5040).—This species is recorded in the Catalogue from all the Australian Colonies except Queensland and Western Australia; in the south-western portions of the latter colony it is exceedingly abundant. Large galls are formed on the twigs and smaller branches of Eucalypts by the larvae, and are sometimes so numerous that the trees affected look very unsightly, or are even killed. The larvae are eaten by the blacks, and by not a few white men; I have heard them called "Bardi," but do not know whether this is the aboriginal name, the true "Bardi" being the larva of a Longicorn (*Bardistus cibarius*, Newm.) which lives in the trunk of *Xanthorrhoea*.

AROMAGIS ECHINATA, Pasc.; l.c. 5041.—This is an exceedingly variable species in regard to the colour and density of its clothing. I have specimens in which the fascicles are almost black and

rather sparse, and others in which they are ochreous and more numerous. Some of my specimens have the rostrum with a dense line of setose scales on each side, and others without or with very feeble lines of scales; there is usually a small tuft of scales near each eye, and sometimes these tufts are almost conjoined. The elytral puncturation is coarse, but often almost entirely concealed. The length (excluding rostrum) varies from $2\frac{1}{2}$ to 5 lines.

A. HORRENS, Pasc.—This species I have not seen; it should be distinct on account of the lateral tubercles of the rostrum.

AROMAGIS SAGINATA, n.sp.

Robust, black, opaque. Densely clothed with brown scales above, becoming fasciculate on tubercles; scales of under surface rather paler than above.

Head large, sculpture concealed by scales. Rostrum thick, slightly curved, widening to base and apex, near apex excavated and with visible punctures. Antennæ densely squamose. *Prothorax* subglobular, granulate and punctate, irregularly tuberculate, a moderately distinct tubercle on each side of middle; from middle to apex with a strong fasciculate crest. *Scutellum* small, elliptic. *Elytra* scarcely thrice the length of prothorax and twice its width, feebly decreasing to near apex; shoulders square; coarsely punctate, punctures partially concealed; with at least six distinct fasciculate tubercles on each elytron, three on the 3rd interstice of which the median one is the smallest, and the apical (at summit of posterior declivity) the largest; three on the 5th interstice all placed slightly to the rear of those on 3rd, the apical one at about the middle of declivity and slightly smaller than the apical one of 3rd; 7th interstice with several feeble fascicles; suture feebly granulate. Length 13, rostrum 3; width 6 mm.

Hab.—Australia (Mr. W. Kershaw, Senr.).

May readily be distinguished from *A. echinata* by its much larger size, differently formed rostrum, centrally crested prothorax, &c. My unique specimen was given to me without exact locality.

ATELICUS INÆQUALIS, Waterh.; Mast. Cat. Sp. No. 5048.—I have a specimen of this species from Frankford, Tasmania. The metasternum is densely covered with fine silken hair gradually thickening to scales on the sides and on the basal segment of the abdomen.

ATELICUS FERRUGINEUS, Waterh.; *l.c.* 5046.—I have four specimens of this species, two from Braidwood and two from Armidale, N.S.W. Only one specimen is $2\frac{3}{4}$ lines in length, and it is without the whitish rings on the apices of the elytra; the smallest specimen is $1\frac{1}{2}$ lines, and has the rings very distinctly marked. The two Armidale specimens were bred from a large Hymenopterous gall on *Acacia* (*longifolia*?). *A. miniatus*, Pasc., from Moreton Bay is possibly synonymous.

ATELICUS ATROPHUS, Pasc.; *l.c.* No. 5044.—Pascoe records this species from S. Australia as well as from Tasmania; I have a specimen from Hillgrove, N.S.W.

ATELICUS VARIABILIS, n.sp.

Narrow, convex, subparallel and subopaque. Red; head, rostrum and sides of metasternum tinged with black. Upper surface clothed with minute, rounded, semitransparent scales; prothorax with a median line of whitish scales joined to a white basal stripe; elytra with a few pale scales about shoulders and apex; rostrum with griseous scales; under surface (excepting apical segment of abdomen) and legs with dense white scales, tibiae ciliate beneath on anterior half.

Head large, a feeble impression between eyes, shallowly punctate. Rostrum obsoletely punctate except at base and sides. Scape minutely punctate, scarcely the length of two following joints combined. *Prothorax* almost equal in length and width; with moderately large, rounded, shallow, irregular, squamose punctures; apex narrower than base, sides rounded, base bisinuate. *Scutellum* small. *Elytra* feebly diminishing from base to near apex, slightly but suddenly constricted just before the middle, apex feebly emarginate; each with ten distinct rows of rounded, scarcely approximate punctures, each of which contains a glassy scale;

posterior declivity rather gradual, nowhere abrupt. *Under surface* and legs not very densely punctate, punctures distinct. *Legs* (for the genus) moderately long; tibiae at apex with blackish setae, the anterior parts beneath with numerous small sharp teeth; 3rd tarsal joint obcordate. Length $8\frac{2}{3}$, rostrum $1\frac{1}{2}$; width 3 (vix) mm.

Hab.—Mt. Kosciusko (Mr. W. E. Raymond).

I have had eight specimens under examination, no two of which are exactly alike; the specimen described above, however, appears to be fairly typical. Some specimens have the prothorax (especially at base and apex) considerably darker than the elytra, the white median line of scales sometimes interrupted in the middle, sometimes marked only at the base, and sometimes entirely absent; one specimen has the prothorax almost black except for a sublunulate reddish blotch on each side, and the base of the elytra is black; the femora are often tinged with black, as is also the basal segment of the abdomen; one specimen is black, the apical four-fifths of elytra, tarsi and antennae excepted. The size varies from $5\frac{1}{2}$ to 9 mm.

This species is perhaps closest to *ferrugineus*, but differs in many particulars, the most noticeable being the absence of white rings and the gradual slope and less width of apex of elytra; the rostrum is thicker and less curved.

It is a curious fact that in this genus the tibiae, tarsi and metasternum much resemble those parts in *Syarbis*, and the puncturation in many of the species is similar. It is perhaps worthy of remark that in *Syarbis*, *Atelicus* and *Aonychnus*, all the species of which are clawless, the tibiae have numerous small teeth beneath; the same is also the case with a clawless species of *Eriirrhiniidae* in my possession.

Subfamily HYLOBIIDES.

Having had occasion recently to examine critically a destructive species of *Orthorrhinus*, and finding that the genus at present is in great confusion, a few remarks on the species referred to it may be acceptable.

ORTHORRHINUS CYLINDRIROSTRIS, Fab.; Mast. Cat. Sp. No. 5105.

—This is an extremely variable species as regards size, colour and clothing, and of which there are numbers of local varieties. Typical specimens have a fascicle (easily abraded) on each side of prothorax at apex; each elytron has two fasciculate tubercles on 2nd interstice, of which the larger is near the middle and the smaller close to base; the 5th interstice has a similar fascicle (preapical callus of Pascoe) on the posterior declivity. The preapical callus is variable both in itself, and in regard to its comparative size with that of the median one of 2nd interstice, being sometimes larger, sometimes equal, but usually smaller. There is occasionally a small fascicle near the apex of 7th interstice. The elytral interstices are usually (but not always) alternately raised. The ♂ differs from ♀ in having the antennæ inserted much closer to apex of rostrum; the anterior legs much longer; the three basal joints of the anterior tarsi greatly expanded and ciliate; rostrum more coarsely punctate, less cylindrical, and somewhat shorter. The differences in the legs, however, are much more noticeable in some specimens than in others. The ♂ (judging by numerous pairs taken *in cop.*) is usually slightly larger than ♀. I have no hesitation whatever in referring several names to this species, either as synonyms or varieties.

O. LONGIMANUS, Boisd.—Described from a large ♂. The Latin diagnosis is unusually long for Boisduval, and is besides followed by a much longer description in French.

O. ASPREDO, Pasc.—Mr. Pascoe says:—"A somewhat isolated species except for the following" (*O. carbonarius*). It is, however, described as having: "A small tuft of ochraceous hairs on each side at the apex" (of prothorax); "and base and middle of the elytra with a small tuft of ochraceous hairs, preapical callus also tufted." It must, therefore, be very close to *cylindrirostris*, and is certainly not entitled to more than varietal rank.

O. CARBONARIUS, Pasc.—Apparently described from an abraded specimen, and therefore not worthy of being considered even as a variety. It has been noted that the insertion of the antennæ is sexually variable.

O. PATRUELI, Pasc.—Certainly a variety of *cylindrirostris*.

O. TENELLUS, Pasc.—A distinct and very common variety in Western Australia.

O. LATERALIS, Pasc.; *O. VAGUS*, Olliff.—Both these are varieties from Lord Howe Island. I have specimens of both.

O. EUCHROMUS, Fairm.—Perhaps entitled to varietal rank; certainly not to specific.

O. SIMULANS, Bohem.—Doubtful if even entitled to varietal rank.

The following are well marked varieties, and appear to be undescribed :

O. CYLINDRIROSTRIS, var. *POMICOLA*, var. nov.

Apical fascicles of prothorax well-developed, ferruginous; base with a large ferruginous patch divided into two by a pale median line. Scales of elytra divided into two distinct patches of almost equal extent, the basal mixed grey and ferruginous, the apical entirely ferruginous. Elytra with a small basal tubercle on 2nd interstice and a rather large median one (on which the two patches of scales are divided), which is slightly larger than the preapical callus. Length 12-15 mm.

Hab.—South-Western Australia.

Abundant in Spring, and very destructive to the bark and young shoots of various fruit trees, especially the peach and apricot. The variety *tenellus* may frequently be seen on grape vines.

O. CYLINDRIROSTRIS, var. *ALBICEPS*, var. nov.

Head with dense white scales, terminated at base of rostrum in ♀, continued almost to apex but gradually narrowed in ♂. Apical fascicles of prothorax small, but prominent and acute. Elytra with more or less uniform scales; 2nd interstice with basal tubercle almost obsolete, the median one with dark scales and smaller than preapical callus, the latter prominent and acute. Length 9-12 mm.

Hab.—Richmond River, Sydney, N.S.W.; Brisbane, Q.

The head in this variety has three narrow nude spaces at the base. I have numerous specimens.

ORTHORRHINUS ÆTHIOPS, Boisd.; Mast. Cat. Sp. No. 5101.—A very distinct species, at first sight appearing to belong to the *Cryptorhynchides*; it occurs in all the Australian Colonies. It is variable in regard to size, colour and clothing. The elytral interstices are sometimes, but not usually, alternately raised.

O. PACIFICUS, Erichs., = *O. ÆTHIOPS*, Boisd.—It is certainly unfortunate that Boisduval's name should have priority.

O. SPILOTUS, Bohem., and *O. CARINATUS*, Pasc.—I can find nothing in the descriptions to warrant separation from *æthiops*.

O. MELEAGRIS, Pasc.; Mast. Cat. Sp. No. 5112.—A distinct species nearer *æthiops* than *cylindrirostris*. So far as I am aware it is confined to southern coastal Queensland.

O. KLUGI, Bohem.; Mast. Cat. Sp. No. 5108.—This is a small and exceedingly pretty species, but is somewhat variable, and is fairly distinct from *cylindrirostris*. It occurs in Queensland and New South Wales.

The following may be distinct species; I cannot recognise or place them:—

O. POSTICUS, Pasc.—Apparently of the *æthiops* type.

O. INFIDUS, Pasc.—Appears to be distinct.

O. LEPIDOTUS, Erichs., Bohem.—Appears to be distinct.

The description of *innubus*, Herbst, appearing as a synonym of *cylindrirostris* in the Catalogue, I have not seen.

Subfamily HAPLONYCHIDES.

HAPLONYX.

The larvæ of most of the species of this genus, at least such as are known to me, live within the woody galls and excrescences formed by various species of Brachyscelids and Hymenoptera, though one species at least (*H. vicinus*, Chev.) is a true gall-maker, and in the larval state lives in companies around a moderately large Eucalyptus twig high up on tall trees. One such gall seen

by me must have contained at least 40 larvæ, a number of which were successfully reared.

Many of the species are extremely variable in size, and the colour of the derm and scales is subject to considerable variation, and, owing to the usually large size of the scales and their feeble juncture with the derm, they are very easily abraded. In most of the species there is a large pale oblique patch on each side of the prothorax, which often resolves itself into two vittæ conjoined at base and reaching the apical tubercles (where there are any such). The one-clawed tarsal joint is usually sufficiently distinct, but in some species can only be traced with extreme difficulty. Chevrolat has divided the genus into six sections, but it appears to me that this is unnecessary, two (depending on the presence or absence of fascicles) being sufficient. Most of the species have a seven-jointed funicle, but in three West Australian species I have under examination it is but six-jointed. Pascoe has proposed a genus (*Aolles*) to receive two species having a six-jointed funicle and trimerous tarsi; I am convinced that he was mistaken in regard to the tarsi, having very little doubt but that I have his *A. rubiginosus*, which has a very small claw-joint traceable only with difficulty (it is almost impossible to see it except with the aid of a compound microscope) in the largely padded 3rd joint, and antennæ distinctly six-jointed; *A. nuceus* I do not know, but the tarsi are probably similar in character. The femora have usually a moderately large tooth, and a smaller one or thick spine below it; in some species, however, there appears to be but one. Each side of apex of tibiæ is supplied with black setose scales or spines, densest internally.

Div. i.—*Fasciculate and tuberculate.*

HAPLONYX ALBOSPARSUS, n.sp.

♂. Black, base of scape and claw-joint reddish-piceous. Head with scattered white scales and small shining granules continued on to rostrum, a shallow fovea between eyes. Rostrum as long as head and prothorax combined, coarsely punctate, apical portion

shining and strongly though less coarsely punctate than base; a carina continuous from near eyes almost to apex. Antennæ slender, with whitish scales (very sparse on club); scape considerably passing muzzle; 1st joint of funicle as long as 2nd-3rd combined, 2nd as long as 3rd-4th. *Prothorax* densely covered with small shining granules; four small black fascicles near apex, the two marginal ones almost obsolete; sparsely clothed with elongate white scales and a few larger ones scattered about, no vittæ; base bisinuate, with a raised and recurved border interrupted on scutellar lobe; a feeble median line. *Scutellum* small, elliptic, densely punctate. *Elytra* considerably wider at base than prothorax; with depressed granules densest at base; two small black fascicles on 3rd interstice and two still smaller on 5th, small white scales scattered about near apex, base and along suture, rest of the derm almost nude; rows of large quadrate punctures feebly separated from each other; interstices feebly convex. *Undersurface* and legs granulate-punctate; sparsely, except on sterna, clothed with elongate white scales, in places very feebly tinged with ochreous. *Legs* long; femora linear, bidentate; tibiæ compressed, bisinuate; 1st tarsal joint with a tubercle in its centre, 3rd densely padded with pale setæ bordered with black; claw-joint and claw distinct. Length $8\frac{1}{3}$, width $5\frac{1}{3}$ mm.

Hab.—Tamworth, N.S.W.

The largest of the genus with which I am acquainted; should be easily identified by its uniform black colour (if constant), its long rostrum, scape (fully half of which passes the muzzle, though this may be but a sexual character) and linear femora. From the description of *ustipennis* it differs, besides scales and colour, in having the rostrum longer than prothorax, scutellum not angular at apex, 3rd and 5th elytral interstices with only two fascicles and femora distinctly bidentate.

HAPLONYX MAGNICEPS, n.sp.

Reddish-brown; head and scutellum piceous, under surface, base of femora, apex of rostrum and club tinged with piceous.

Head large, flattened; with minute shining granules and pale elongate scales; feebly foveate between eyes. *Rostrum* about the length of *prothorax*, broad, flat, coarsely punctate and very minutely and densely punctate; without carina except at extreme base; sides feebly ridged and darker. *Scape* passing muzzle, feebly curved; 1st joint of funicle large, as long as two following combined. *Prothorax* not once and one-half wider at base than apex, apex very feebly emarginate in the middle; base, except for scutellar lobe, almost straight, a feeble median line; a very feeble black fascicle on each side at apex and a few blackish scales behind them scarcely forming fascicles; straw-coloured scales regularly dispersed. *Scutellum* small, subelliptic, with black scales. *Elytra* not much wider than *prothorax* at base, shoulders very feebly projecting, punctate-striate, punctures not very large, and, except at sides, not close together; interstices feebly raised, distinctly wider than punctures, on 3rd two feeble blackish fascicles and on 5th three, scales as on *prothorax*. *Under surface* and *legs* with paler and shorter scales than above. *Femora* thick, with a large recurved tooth and a smaller scarcely traceable one below it; *tibiae* bisinuate; *claw-joint* and *claw* squamose, distinct. Length $4\frac{1}{8}$, width $2\frac{1}{2}$ mm.

Hab.—New South Wales (Mr. Kershaw, Senr.).

The large head, great (comparative) width of apex of *prothorax*, and almost obsolete fascicles are sufficiently distinctive of this species; I do not know of any with which it can be satisfactorily compared; it might almost be referred to the section without fascicles.

HAPLONYX PULVINATUS, n.sp.

Reddish-brown, tinged with piceous on head, club, under surface and base of femora; scutellum black. *Head* with brownish scales, paler bordering eyes. *Rostrum* stout, almost parallel-sided, flat, and a little longer than *prothorax*, punctate and squamose except at its extreme apex; feebly carinate from a small ocular fovea to antennal insertion. *Scape* distinctly passing muzzle; 1st joint of funicle stout, not much longer than 2nd; club subovate. *Prothorax* with sparse brownish scales and two lateral oblique pale

vittæ; four brownish fascicles in front, the anterior pair being very small, the posterior pair nearer the base than is usual in the genus; base bisinuate, seen from above apparently with a feeble transverse impression on each side. *Scutellum* small, indistinct. *Elytra* wider than prothorax, the obliquity of the shoulders continuous with the sides of that segment; with dingy scales densest about suture; at base of suture and partly on scutellum there is a very distinct black fascicular elliptic patch of scales; 2nd interstice with 3 fascicular tubercles, the basal one small, the middle one larger than all on each elytron combined, the apical smaller than basal and—to the naked eye—appearing as a white point; 3rd interstice with three small tubercles, only the basal one being moderately distinct; punctate-striate, punctures moderately large, subquadrate; interstices convex, about the width of punctures. *Undersurface* with paler scales than upper. *Femora* stout, bidentate; tibiæ curved, not bisinuate; claw-joint squamose, moderately distinct. Length $2\frac{1}{2}$, width $1\frac{3}{4}$ mm.

Hab.—Sydney.

A small species, easily recognisable on account of its large black scutellar patch, large tubercle in middle of 3rd interstice (in this respect resembling *Macleayi*) and simple tibiæ.

HAPLONYX BIDENTATUS, Chev.—M. Chevrolat proposed this name (Le Naturaliste, 1879, p. 60) in place of *rubiginosus*, that name having been already used in the subfamily by Mr. Pascoe. I have specimens from New South Wales, South and West Australia. It appears to be somewhat variable in the markings, as I have specimens in which there is a broad sutural stripe opening out into a large apical patch of whitish scales, and others without any whitish scales on the elytra. Possibly Pascoe's *myrrhatus* was described from such a specimen, but as he says "*femoribus infra obsolete dentatis*" it is possibly a distinct species, as all my specimens of *bidentatus* have a rather large as well as a small tooth on the femora; in fresh specimens, however, they are somewhat obscured by scales. *H. dotatus*, Pasc., must also be very close to this species.

HAPLONYX FASCICULATUS, Bohem.; Mast. Cat. Sp. No. 5358; (*H. turtur*, Pasc.; *H. venosus*, Pasc.).—I am convinced that these are but forms of a species extremely variable in size, colour of derm, colour of dermal and length of fascicular scales; and of which I have taken specimens in South Australia (the original locality of Pascoe's specimens), New South Wales and West Australia. The eyes are usually fringed with paler scales than on the rest of the head; the space between the four prothoracic scales is usually, but not always bare; in Western specimens the fascicular scales are usually longer than in Eastern ones, and they are occasionally decumbent. The scales at the base near the scutellum and on the shoulders vary from a pure snowy-white to a sooty-grey, brown, or ochre; on the under surface the scales vary from snowy-white to dirty grey, and are much darker (usually reddish-brown) at the sides. The rostrum of male is a little wider towards apex than in female. Range of variation in size $2\frac{1}{2} \times 1\frac{3}{4}-5\frac{1}{2} \times 3\frac{1}{2}$ mm.

I have a small and extremely pretty little specimen which I take to be one of the varieties of this species; the scales at the side of the prothorax are snowy-white, rather densely packed and interrupted by an oblique line of black elongate ones; the elytra have numerous interrupted fasciæ of black, brown, ochreous and snowy scales; it comes from Tamworth. Two other specimens (from Tamworth and Forest Reefs) have the scales on the upper surface entirely black, except a small white spot on each shoulder and the remnants of two oblique vittæ on the sides of prothorax.

HAPLONYX KIRBYI, Fahrs.; Mast. Cat. Sp. No. 5362.—If I am correct in my identification of this species, it is a rather broad one, which is very variable as regard size, some of my specimens being fully five times as large as others; the largest measures $4\frac{1}{2} \times 3\frac{1}{4}$ mm. It is widely distributed in New South Wales.

HAPLONYX MACLEAYI, Chev.; Mast. Cat. Sp. No. 5364.—I have a specimen from Cootamundra which is without white elytral fasciæ, but as this is a character which is subject to variation or occasional obliteration, and as in all other details it agrees perfectly with the description of *Macleayi*, even to size, I am nearly confident that it is that species.

H. SPENCEI, Gyll.; Mast. Cat. Sp. No. 5380. *Hab.*—N.S.W.; widely distributed.

Div. ii.—*Without fascicles or tubercles.*

HAPLONYX PORCATUS, n.sp.

Entirely dark reddish-piceous. *Head* convex, granulate and punctate, and with scattered whitish scales; a shallow impression between eyes. Rostrum about the length of prothorax; densely punctate, punctures towards apex smaller and more elongate, a much interrupted median line. Scape passing muzzle. *Prothorax* bisinuate, granulate-punctate; with elongate whitish scales rather evenly distributed and feebly marking median line. *Scutellum* subcordate, punctate and squamose. *Elytra* subtriangular; shoulders oblique; sparsely and evenly covered with small elongate scales except a rather broad patch at base and a postmedian fasciate band; with rows of large oblong punctures or foveæ, larger and less elongate at sides and smallest towards apex; interstices very feebly convex, nearly as wide as punctures at base, much less towards sides; suture and shoulders with small granules, which become depressed on the rest of the surface. *Under surface* and *legs* with moderately dense small subelongate scales. Anterior femora sublinear, with irregular teeth; tibiæ bisinuate; claw-joint shining, without pubescence. Length 5, width $3\frac{1}{2}$ mm.

Hab.—Mt. Lofty, South Australia.

The punctures on the elytra of this species are much larger than in many others with which I am acquainted. When alive it appears to have been covered on the elytral fasciæ and perhaps the mesosternal epipleuræ with some sort of exudation, traces of which still remain; great care is required to preserve this substance intact, and as my trip to Mt. Lofty was extremely hurried everything collected was placed in spirits.

HAPLONYX PUNCTIPENNIS, n.sp.

Reddish-brown, scutellum and coxæ piceous. *Head* rather large, granulate, punctate, feebly squamose. Rostrum short,

straight, flat, parallel-sided, not or scarcely twice as long as wide; coarsely punctate. Scape passing muzzle; club large. *Prothorax* granulate, punctate; base not twice the width of apex; moderately elongate scales regularly distributed except at sides, where they combine to form two oblique vittæ. *Scutellum* small, semicircular. *Elytra* slightly longer than wide, a circular patch about scutellum of black subfasciculate scales, surrounded except apically with white scales; a few white scales scattered about near apex, sides and base, elsewhere nude; punctures large, quadrate, largest at sides; interstices granulate, near suture as wide as punctures, much narrower at sides. *Under surface* and *legs* moderately densely clothed with white subelongate scales. Femora rather thick, unidentate; tibiæ bisinuate, basal sinus twice as long as apical; claw-joint squamose. Length 4, width $2\frac{3}{4}$ mm.

Hab.—Hillgrove, N.S.W. (Dr. C. Hardcastle).

Differs from *centralis*, besides colour and clothing, in being less convex, elytra narrower towards apex, rostrum shorter and elytral punctures stronger; from the description of *cionoides* in having the rostrum short, not at all cylindrical, and the prothorax not three times wider at base than apex.

HAPLONYX SORDIDUS, n.sp.

Reddish-brown, antennæ and claw-joint paler; scutellum, head, club, under surface and coxæ piceous. *Head* large, minutely granulate and punctate; sparse whitish scales irregularly clustered together; a feeble impression between eyes. Rostrum as in the preceding. Scape considerably passing muzzle; 1st joint of funicle short, perfectly triangular, not much longer than 2nd; club large. *Prothorax* not once and one-half wider at base than apex; base bisinuate, thickened; scutellar lobe truncate; apex feebly emarginate in the middle; punctate and granulate; straw-coloured scales feebly scattered about the base in the middle, and forming three irregular vittæ on sides, a few darker scales in the middle. *Scutellum* feebly transverse, punctate. *Elytra* with feeble traces of three fasciæ across middle, somewhat more densely squamose at base and apex; punctures large, subquadrate, scarcely larger

at sides than near suture; interstices densely granulate, convex, the 2nd, 3rd, 5th and 7th more noticeably so. *Under surface* with whitish scales, sparser on abdomen. *Femora* moderately thick, bidentate; *tibiæ* bisinuate; claw-joint squamose, distinct. Length 4, width $2\frac{1}{2}$ mm.

Hab.—Sydney.

Somewhat similar to the preceding in shape, but with thicker and bidentate femora, elytra more feebly punctate and more distinctly granulate; the shoulders not at all oblique (in that species they are scarcely but still noticeably obliquely rounded); from the following it differs in being narrower, with a shorter and thicker rostrum, less granulate and more convex interstices; in the following species also the scutellum is much more noticeably transverse.

HAPLONYX ATER, n.sp.

Black; antennæ—except club—dull red. *Head* punctate and distinctly granulate, very sparsely squamose. Rostrum a little longer than prothorax, rather wide, suddenly but slightly increasing in width at insertion of antennæ; base coarsely punctate, apex with finer and (proportionately) longer punctures. Scape passing muzzle for about one-third its length; 1st joint of funicle elongate-triangular, not much thicker or longer than 2nd; club elongate. *Prothorax* about once and one-half wider at base than apex; base bisinuate; scutellar lobe truncate; distinctly granulate, and with feeble scattered white scales. *Scutellum* distinctly transverse, triangular. *Elytra* not much wider than long, with very few scattered white scales; punctures large but distinct only near sides; interstices convex, wider than punctures, distinctly granulate throughout. *Under surface* and *legs* with white scales not very densely distributed and of two shapes, long and thin, and obtriangular. *Femora* sublinear, unidentate; *tibiæ* curved, the anterior feebly bisinuate, the median piece scarcely interrupting the general outline; claw-joint feebly squamose, distinct. Length 4, width $2\frac{1}{2}$ mm.

Hab.—Forest Reefs, N.S.W.

An entirely black species, except for the antennæ, and having the outline of the elytral punctures much obscured by granulations; the elytral epipleuræ are more distinct than is usual in the genus.

HAPLONYX UNIFORMIS, n.sp.

Dull red; scutellum and coxæ piceous. The entire upper surface (except rostrum) equally covered with pale brown or testaceous scales, appearing circular under a Coddington lens, but subquadrate under a compound microscope; on the elytra there are a few indistinct spots of paler scales. *Rostrum* parallel-sided, flat; a little longer than prothorax, almost equally punctate throughout. Scape scarcely passing muzzle; 1st joint of funicle more than half the length of 2nd-7th, and almost as long as club. *Prothorax* widely transverse, base bisinuate; scutellar lobe semi-circular. *Scutellum* punctate, elongate, not squamose. *Elytra* with very feeble traces of striæ, and punctures, if present, entirely concealed by scales. *Under surface* with squarish white scales, becoming straw-coloured and much denser on sides of sterna. *Femora* thick, anterior with but one tooth, and that very small; tibiæ straight, almost without sinuosity; tarsi large; claw-joint very small and traceable only with difficulty. Length $2\frac{1}{2}$ (vix), width $1\frac{2}{3}$ mm.

Hab.—New South Wales (Mr. Kershaw, Senr.).

A small species with several unusual characters; the tibiæ in all the species I have examined are usually noticeably bisinuate or else strongly curved; in this species, however, they appear to be perfectly straight on the undersurface, being scarcely interrupted by a very small projection a little before the apex; the femoral tooth is also very minute. It is also the only species I have seen in which the club is concolorous with the rest of the antennæ. The scales on the upper surface are unusually large, regular, and closely applied to the derm.

HAPLONYX LONGIPILOSUS, n.sp.

Dull brownish-red, under surface and club darker; scutellum piceous. *Head* flattened, punctate, granulate, feebly squamose.

Rostrum as long as head and prothorax combined; subcylindrical, parallel-sided to beyond antennæ; deeply and somewhat regularly punctate, the punctures causing five longitudinal carinæ to appear, only the middle one of which is distinct. Antennæ slender; scape not passing muzzle one-third of its length; funicle six-jointed, 1st scarcely thickened; club rather slender, continuously thickened with funicle. *Prothorax* twice as wide at base as apex; base bisinuate; scutellar lobe truncate; equally clothed with rather long thin testaceous scales; granulate, punctate. *Scutellum* short, subtriangular, punctate. *Elytra* with scales as on prothorax, except that a large lateral subtriangular patch is almost nude; large quadrate punctures largest at sides; interstices granulate, convex, much narrower than punctures; shoulders feebly rounded. *Under surface* with paler and shorter scales than above. *Legs* long; femora slightly thickened, bidentate, the anterior tooth very indistinct; tibiæ bisinuate, the basal sinus semicircular, much shorter than apical; claw-joint feebly squamose, moderately distinct. Length 5, width $3\frac{1}{4}$ mm.

Hab.—Swan River.

The tibiæ in this genus often present useful characters for specific distinction; in this species they might be said to be semicircularly emarginate at base, the basal sinus being much shorter and deeper than the apical, a character also possessed by the following species; the clothing on the upper surface is longer and more uniform in colour than is usual.

HAPLONYX TIBIALIS, n.sp.

Piceous; elytra, abdomen and antennæ (except club) dull red; rostrum sometimes piceous but usually dull red. Scales short, pale brown, almost equally and rather densely covering upper surface. *Head* with scales all converging to centre, trace of a feeble impression between eyes. Rostrum as long as or slightly longer than prothorax; subcylindrical, slightly narrowed about antennal insertion, densely punctate; carinate or not, the carina when present usually feebly bifurcate about the middle, nearly always traceable but very feeble on muzzle. Scape passing muzzle, in ♂

more elongate than in ♀; funicle distinctly six-jointed, 1st joint obtriangular, scarcely as long as 2nd-3rd combined, 4th-6th transverse; club moderately elongate. *Prothorax* not twice as wide at base as apex, a feebly traceable median line, scales at side somewhat paler than on disc; apex feebly emarginate, base bisinuate, marked with paler scales. *Scutellum* transverse, subcordate. *Elytra* broad, not much wider than prothorax, shoulders very feebly produced; distinctly but not deeply striate; pale rounded scales in the striae but not regularly between punctures, being more noticeable at apex, base and middle; interstices broad, scarcely convex, much wider than striae; two feeble interrupted fasciae across middle caused by the scales there being a little darker and smaller. *Under surface* and legs moderately densely clothed with white rounded scales, denser on sterna, at the sides of which they become ochreous. *Legs* stout; femora unidentate; tibiae emarginate at base, from emargination to apex bordered with small blunt teeth about sixteen in number, just visible with a Coddington lens; tarsi broad, three basal joints almost equally padded with pale setae; claw-joint very small, scarcely visible from above, not protruding beyond tarsal pad. Length 6, width 4; range of variation 5-7 mm.

Hab.—Swan River. Beaten from young Eucalypts on which were numerous specimens of *Brachyscelis strombylosa*.

A broad depressed species with peculiar tibiae, the small teeth mentioned being on the lower and outer side; the antennae of ♂ differ from those of ♀ (or perhaps *vice versa*) in being longer and thinner; the scape, however (owing to the prolongation of the rostrum), only passes the muzzle in the same proportion. From *H. (Aolles) rubiginosus* it differs (besides size and width) in having the scales on the elytral interstices packed five deep, except towards base, where they are denser; in that species they do not appear to be more than three deep and are less regular in shape; *rubiginosus* has also large fluted snowy-white scales (similar to those on abdomen) between puncture and puncture, but they are very easily lost; out of forty-two specimens I have under examination (all collected within the past two years) but seven are perfect

in this respect. The scales on the abdomen of a fresh specimen are extremely pretty, and are similar in character in all the species I have examined, though varying in size, width and colour; they are convex and fluted their entire length, and when large are very easily abraded.

HAPLONYX (*AOLLES*) *RUBIGINOSUS*, Pasc.; Mast. Cat. Sp. No. 5346.—As previously mentioned this species is properly referable to *Haplonyx*. I have it from Swan River (common), Darling Ranges and Mt. Barker.

HAPLONYX VESTIGIALIS, Pasc.; Mast. Cat. Sp. No. 5386.—I have a number of species of *Curculionidæ* belonging to widely separated genera which have a pinkish or vermilion-coloured exudation. Spirits rapidly destroy it, leaving scarcely a trace except perhaps a blotched greasy appearance where it has been. An undescribed species of *Hyllobius*, a specimen of which I obtained four years ago, was entirely covered; it was killed by removing the head, and the colour and position of the exudation was kept for about two years, but the specimen then became greasy and the exudation rolled up into little balls, though a trace of the tint remains. Sydney.

HAPLONYX CIONIFORMIS, Chev.; Mast. Cat. Sp. No. 5353.—I have specimens of this species from Swan River ranging in size from $3\frac{1}{2}$ to $4\frac{3}{4}$ mm. The legs are rather longer than is usual in the genus.

HAPLONYX SEXVITTATUS, Chev.; Mast. Cat. Sp. No. 5379.—Widely distributed in New South Wales and varying in size from $3\frac{1}{2}$ to $4\frac{1}{2}$ mm. The colour of the derm is much paler in some specimens than in others, as are also the scales with which it is clothed. The six prothoracic vittæ are seldom very distinct, the two median ones being usually obscured. In ♂ the rostrum is short, and could fairly be stated to be "*ad basin multi-costato*"; in ♀ it is longer, thinner, and the punctures are more irregular.

HAPLONYX NIGRIROSTRIS, Chev.; Mast. Cat. Sp. No. 5370.—If I have rightly identified this species it is one which is widely distributed in New South Wales, and, like *vicinus*, may commonly

be beaten from the drying leaves of freshly felled Eucalyptus. I have specimens in which the rostrum is entirely black, and others in which there is scarcely a tinge of piceous.

H. CENTRALIS, Pasc.; Mast. Cat. Sp. No. 5351. *Hab.*—South Australia.

H. MAIALIS, Pasc.; *l.c.* No. 5365. *Hab.*—New South Wales (widely distributed).

H. VICINUS, Chev.; *l.c.* No. 5387. *Hab.*—Tamworth, Forest Reefs, Sydney.

SIGASTUS FASCICULARIS, Pasc.; *l.c.* No. 5389. *Hab.*—Swan River.

ZEOPUS STOREOIDES, Pasc.; *l.c.* No. 5347. *Hab.*—Swan River.

Subfamily BARIDIIDES.

PSALDUS, Pascoe (1870).

I have no doubt whatever but that this genus is identical with *Notiomimetes*, Wollaston, 1873; and moreover that *N. Pascoei*, Woll., is a synonym of *P. liosomoides*, Pasc. I have both species described by Pascoe.* In a footnote to *P. ammodytes*, Pascoe remarks that *Aphela* and *Psaldus*† should form a subfamily near the *Molytides*. I cannot see that they are very close to that subfamily; they appear to me to be intermediate in position between the *Baridiides* and *Cossonides*, and that Wollaston in referring *Notiomimetes* to the latter subfamily was not very wide of the mark. *Psaldus* and *Aphela* are closely allied (if not identical), and the species have exactly the same habits; *A. algarum* is certainly closer to *P. liosomoides* than it is to *A. helopoides*.

* It appears to me that *P. ammodytes* is but a feeble variety of *P. liosomoides*. I have taken specimens at King George's Sound and Champion Bay (the original localities), and they appear to be very variable in regard to colour and size. In the Champion Bay specimens (*ammodytes*) the rostrum and abdominal punctures appear to be more feeble than in those from the Sound, but I can detect no other structural differences.

† Together with *Emphyastes*, a genus not represented in Australia, and unknown to me.

ON THE LIZARDS OF THE CHILLAGOE DISTRICT,
N. QUEENSLAND.

By R. BROOM, M.D., B.Sc.

During a residence of over six months in North Queensland I devoted most of my spare time to the collection of zoological and botanical specimens. The township of Muldiva in which I resided came into existence in connection with some local silver mining and smelting operations, and when the working of the silver had to be abandoned through the fall in prices the township did not long survive the death of the industry. Muldiva was situated almost on the dividing range between the Walsh River and the Tate, about 70 miles west of Herberton, and at an elevation of about 1800 feet. The country consists for the most part of undulating plains, from which there rise numerous low ranges of hills. To the north the hills and rocks are chiefly composed of quartzite and limestone, which, when disintegrated, give rise to a fairly good soil. To the south the character of the country is very different, almost all the rocks and hills being composed of granite. Here the soil is very poor, being chiefly composed of sand and small pieces of quartz from the disintegrated granite, while at a depth of a foot or two is generally found a substratum of clay from the decomposed felspar. The whole country side is covered with the usual open forest of Eucalyptus trees, with a considerable admixture of other sorts, Grevilleas, Brachychitons, Acacias, &c. During the eight months from April to November, as a rule, there is practically no rain, and almost all the vegetation, with the exception of the trees, becomes withered up, giving the whole district a very barren appearance. From December till March there are thunderstorms nearly every day with an abundant rainfall, which soon gives rise to a luxuriant

outcrop of grass and flowers. The long spell of dry weather seems to be unfavourable to the reptilian fauna, and as a result snakes are rare, and lizards not very plentiful. Though a careful search reveals the presence of a considerable variety of forms, only four or five lizards are at all common. In the following list are noted all the lizards that have been found, and though it is not improbable that a few other forms exist in the district which have not been observed the list may be held to give a fairly good idea of the lacertilian fauna :—

NEPHRURUS ASPER, *Gthr.*—This remarkable little lizard is no doubt rare, as I was not fortunate in personally coming across a specimen, though two were brought me, one of which was alive. In its movements it resembles much more the chameleons than any of the normal geckoes. The live specimen made no attempt to bite, and would allow itself to be lifted without making any great resistance. In the stomach of the other specimen I found the remains of a cricket, and some other much digested remains, probably those of caterpillars.

GYMNODACTYLUS PELAGICUS, *Gir.*—In my collection I find only one specimen of this gecko, so that it must be regarded as rare.

HETERONOTA BINOBI, *Gray.* Native name *Mbootoo*.—This little gecko is one of the commonest lizards of the district. It is chiefly found on the ground under stones, pieces of bark and fallen timber.

DIPLODACTYLUS PULCHER, *Stüder.*—One of the rarer geckoes of the district.

CEURA TRYONI, *DeVis.* (= *C. ocellata*, *Blgr.*).—This beautiful gecko is by no means rare, and the variations in colour are remarkable. The variety figured in the British Museum Catalogue as *C. ocellata* is the form least commonly met with, most specimens being more or less distinctly banded, and, though there is no constancy in the markings of the body, there is generally a more or less marked dark band round the occipital region. In spirit specimens the bright colouring of this gecko is to a large extent lost. It is chiefly found among the limestone rocks.

CECURA RHOMBIFERA, Gray.—Though by no means so plentiful as *Heteronota binoei*, this little gecko is fairly common, but is found in quite different situations from that form—generally frequenting the roofs of bark outhouses. It is a very agile little lizard, and it is particularly interesting to watch its stealthiness in stalking its prey, and its quick little spring when within striking distance. At times, however, it appears possessed of more valour than discretion, as I have seen a little one 3 inches long vainly endeavouring to catch a dragonfly considerably larger than itself, which had got into an outhouse and was buzzing round the roof, the little gecko making a spring at it every time it passed.

GEHYRA VARIEGATA, D. & B. Native name *Dtella*.—In most of the wooden dwelling-houses is to be found this very pretty gecko. During the day it lies hidden in some corner, and in the evening is found wandering about the walls.

PYGOPUS LEPIDOPUS, Lacép.—This snake-like lizard, though occurring in the district, is exceedingly rare.

TYMPANOCRYPTIS CEPHALUS, Gthr.—Though not common, I was fortunate in obtaining three or four specimens of this pretty little Agamid. All the specimens I obtained were got among the limestone rocks.

DIPOROPHORA AUSTRALIS, Stdchr. Native name *Urnysem*.—This is by far the commonest of the lizards of the district. It is well distributed, but most abundant in the limestone country. In general habit it resembles young specimens of *Amphibolurus muricatus*, but unlike that species is rarely seen except on the ground. When standing on the look-out it holds its little round head well elevated on its slender neck. When disturbed it runs off at a pretty rapid pace.

An interesting point about this lizard is the very remarkable variation in colouring that is met with. From specimens beautifully ornamented with sooty-black markings, to light slate-coloured specimens with scarcely a trace of markings almost every degree

of ornamentation can be found. The colouring and marking of specimens had apparently very little, if any, connection with the surroundings, light and dark specimens living together in the one situation, and apparently getting on equally well in the "struggle for existence."

CHLAMYDOSAURUS KINGII, *Gray*.—The great frilled lizard is not common, but is occasionally met with. I kept a full-grown specimen for some days. It became quite tame, and would allow me to carry it about in my arms. Its long legs give it a different appearance from almost all other lizards. One day while riding in the bush I observed a fine specimen run up a tall slender tree; dismounting I followed thinking I could not but catch it. When near the top, and I within a couple of feet of it, seeing no escape down the tree, it took a flying leap of 30 feet or so, and long before I was down, was up a second tree, where I left it undisturbed.

TILIQUA SCINCROIDES, *White*. Native name *Ngura*.—The large scaly or blue-tongued lizard is not uncommon. I kept a large specimen alive for some months, feeding it on little scraps of meat. Considering the size of the lizard it is remarkably powerful, and when sitting at bay is by no means to be played with. If a stick be presented to it, it snaps at it, and then rapidly rolls itself round and round on its side, and unless the stick be firmly held, the lizard will probably twist it out of the hand. The one I had alive was kept secured by a string round its neck, and with a box for a kennel. When out feeding endeavours were made at different times to induce dogs to attack it, but it would hold its own like a cat, facing round to whichever side the attack was threatened from, and after keeping its assailant at bay for some time, on the first favourable opportunity would rapidly run into its box for safety.

LYGOSOMA LESUEURII, *D. & B.*—In North Queensland this common skink differs somewhat in colour from the specimens collected in New South Wales. In the northern specimens the general shade is a light brown; in the southern specimens a dark

olive-brown. Though I have seen scores of specimens in New South Wales I have not seen one with the peculiar light tint of the northern variety; nor are there any dark coloured specimens among those collected by me in the north. As regards markings, scales, &c., there are no appreciable differences between the two.

Next to *Diporophora australis* this is the commonest lizard in the district. It is exceedingly active and very difficult to capture.

LYGOSOMA ELEGANTULUM, *Ptrs. & Doria*.—This beautiful *Lygosoma* is not uncommon. Though the large majority of the lizards are found chiefly in the limestone district, all the specimens I obtained of this form were from the granite region where they were found under fallen timber.

LYGOSOMA NOVÆ-GUINÆÆ, *Meyer*.—Not common.

LYGOSOMA GUICHENOTI, *D. & B.*—Not common.

LYGOSOMA FUSCUM, *D. & B.*—This lizard may be regarded as rather rare. In addition to the ordinary form I obtained a specimen of a variety which differs somewhat from the normal type. On the back and sides the scales are very markedly carinate. From the occiput to the shoulder region most of the scales are tricarinate, but behind this in the six dorsal rows the scales are practically all bicarinate, the bicarinate scales being continued on to the tail. The lateral and dorso-lateral scales are mostly tricarinate, but on nearing the abdominal region the scales become feebly bicarinate.

LYGOSOMA PECTORALE, *De Vis*.—Rare; only one specimen obtained.

LYGOSOMA MUNDIVENSE, n.sp.

The above name I have proposed for a presumably new *Lygosoma*, of which only one specimen was found.

Habit lacertiform. Distance between end of snout and fore limb contained $1\frac{1}{2}$ in distance between axilla and groin. Snout moderate, obtuse. Lower eyelid with undivided transparent disc, which is considerably larger than ear opening. Nostril pierced

in nasal. No supranasal. Fronto-nasal half broader than long, broadly in contact with rostral, just touching the frontal. Frontal slightly longer than fronto-parietals, in contact with 1st and 2nd supraoculars. Four supraoculars, the 4th larger than the 1st, the 2nd and 3rd subequal. Seven supraciliaries. Fronto-parietals united about as broad as long. Interparietal small. Parietals forming a median suture. One pair of nuchals and one pair of temporals border the parietals. Five upper labials in front of the subocular. Ear opening round, smaller than transparent disc, surrounded by small lobules, the anterior ones largest. Thirty-eight scales round the body, bi- and tri-carinate irregularly arranged. Præanals very slightly enlarged. Hind limb reaches axilla. Fore limb with four digits, hind limb pentadactyle. Twenty-six to twenty-seven subdigital lamellæ under 4th toe.

Light olive with on back large irregular spots or blotches of black each covering 2-4 scales; in the lateral region the spots form a reticulation especially by the side of the neck. Spots continued to the toes and to the point of the tail. Head above unspotted, laterally the upper labials are edged with black. Each lower labial has a black spot largest in posterior ones.

Total length	102 mm.	Fore limb	15 mm.
Head	12 "	Hind limb.....	22 "
Width of head.....	7 "	Tail.....	60 "
Body	30 "		

Loc.—Muldiva, N. Queensland.

The name of the township is a corruption of the aboriginal name for the creek Mundiva after which I have named the species.

ABLEPHARUS TENUIS, *Broom* (Ann. Mag. N.H. (6) xviii., Oct. 1896, p. 342).—Rare.

ABLEPHARUS ORNATUS, *Broom* (*l.c.* p. 343).—Not common.

ABLEPHARUS BOUTONII, *Desj.*, var. *PERONII*, *Cock.*—Widely distributed and moderately common.

VARANUS GOULDII, *Gray.*—Native name *Wongo*. Though this moderately large monitor is fairly common further east, it is

rather scarce around Muldiva, and the only specimens I obtained were those brought to me by the natives.

VARANUS TIMORENSIS, *Gray*.—This small monitor is fairly common. In general habit it differs considerably from the larger sorts, and owing to the more feeble development of the limbs is not nearly so swift. When handled a peculiar sickly odour is given off.

In conclusion I must acknowledge my indebtedness to Mr. G. A. Boulenger, F.R.S., for kindly giving me his opinion on one or two specimens about which there was a little doubt.

ON A *TRACHYPTERUS* FROM NEW SOUTH WALES.

BY J. DOUGLAS OGILBY.

So little is known about the life history of the fishes belonging to this family that any new facts, however apparently trivial in themselves, which relate to their appearance and distribution acquire exceptional value, and should be recorded in full; especially should the changes which are now known to take place during the progress of the fish towards maturity be carefully noted and the results tabulated. For it is only by the collection and collation of these scattered references that we may in time hope to gain some insight into the economy of these strange denizens of the ocean depths.* It is therefore with great pleasure that I am enabled to lay before you to-night a detailed description of a young example which was recently washed ashore near Newcastle, and fortunately came into the possession of the authorities of the local Museum. For the opportunity of examining this rare fish I am indebted to the courtesy of Mr. Alfred Finckh, of the Technological Museum, who kindly placed the specimen at my disposal for the purposes of the present paper.

Before, however, proceeding to describe the Newcastle example, it seems to me advisable to briefly review the meagre literature of the genus, so far as it refers to those specimens which have been recorded from the south-western Pacific.

* An excellent commencement of this very necessary work has been made by Emery, who, in a valuable paper published in the "Atti Acad. Lincei, Rome. iii. 1879, pp. 390-395, ff. 1-6," gives details of the examination of twenty-three specimens, and shows that three Mediterranean forms—*T. spinola*, *T. tænia*, and *T. iris*—which had always been recognised as distinct, are but successive stages in the growth of one and the same species; the true name of which should be *Trachypterus trachyptera* (Gmelin). Unfortunately I have not been able to consult Emery's article.

Just ten years ago Günther* wrote as follows:—

“The instances of the occurrence of this genus in the Pacific are very few, viz., *Trachypterus altivelis* (Kner)† from Valparaiso, *Trachypterus weychardti* (Philippi)‡ also from the Chilian coast, and *Trachypterus arawata* (Clarke) from the coast of New Zealand.”

In addition to these, however, he refers to a species described by Bleeker from the East Indian Archipelago under the name of *Trachypterus semiophorus*,§ and himself records a very young example dredged by the Challenger in the neighbourhood of the Philippine Islands.

To these I may add the occurrence of *Trachypterus altivelis* on the coast of New Zealand as reported by Hutton, and of the same species subsequently noticed from the seas of Tasmania by Johnston; of a large specimen from Manly Beach described by Ramsay as *Regalecus jacksoniensis*; of three specimens obtained on the Victorian coast and figured by McCoy as *Trachypterus tænia*; and finally of a species described as new by Jordan and Gilbert under the name of *Trachypterus rex-salmonorum*|| from the open sea outside of the Bay of California.

Confining myself to the species of which we have authentic records from the south-western Pacific, as being of more immediate interest to Australian biologists, the following list of specimens will, I believe, be found accurate:—

1. *Trachypterus altivelis*, Hutton, Trans. N. Zeal. Inst. v. 1873, p. 264. A dried specimen in the Auckland Museum; length 500 millimeters.

* Zool. Challenger, xxii. p. 72, 1887.

† Sitzb. Ak. Wien, xxxiv. i. 1859, p. 437, pl. i.; this is the only Pacific species mentioned by Günther in his Catalogue of Fishes (iii. p. 303).

‡ Arch. f. Nat. xli. 1874, p. 118, pl. iii.; described from a photograph.

§ I am unable to find any description of this species or even any reference to the work in which it is described.

|| Proc. Calif. Ac. Sc. (2) iv. 1894, p. 144, pl. ix.

2. *Trachypterus altivelis*, Hutton, Trans. N. Zeal. Inst. viii. 1876, p. 214. An alcoholic specimen in the Otago Museum.
3. *Trachypterus arawatae*, Clarke, Trans. N. Zeal. Inst. xiii. 1881 (April), p. 195, c. fig. Jackson's Bay, New Zealand; specimen and type of species in the Colonial Museum, Wellington, in alcohol. Length 90 millimeters.†
4. *Regalecus jacksoniensis*, Ramsay, Proc. Linn. Soc. N.S. Wales, v. 1881 (May), p. 631, pl. xx. (= *Trachypterus jacksoniensis*, Ogilby, Catal. Fish. N.S. Wales, p. 43, 1886). Manly Beach, New South Wales; type of the species a plaster cast with the skin stretched over it in the Australian Museum, Sydney; length 1400 + x millimeters.
5. *Trachypterus altivelis*, Johnston, Proc. Roy. Soc. Tas. 1882, p. 123. Spring Bay, east coast of Tasmania; specimen in the Royal Society's Museum, Hobart.
- 6, 7, 8. *Trachypterus tœnia*, McCoy, Prodr. Zool. Vict. dec. 13, pl. cxxii. 1886. Portland, Victoria; specimens in the National Museum, Melbourne; length 63 to 256 millimeters.

The trachypterid now under consideration is therefore the ninth example of which we have any definite record from the Australasian Colonies, and as it differs somewhat from any of the others I am constrained to submit the following detailed description, and in the belief that it will prove to be worthy of at all events subspecific rank, the name *polystictus* is here proposed on account of the numerous spots which ornament the head and body.

† In an editorial note to Clarke's paper Sir James Hector remarks:—"The author has overlooked the occurrence of another specimen of this species" (? species of this genus) "*T. altivelis*, Kner, in the Auckland Museum; and other specimens, since collected, are in the Wellington and Dunedin Museums." I can find no record of any such specimens, and am, therefore, unable to include them in my list.

As it is evidently more closely allied to *T. jacksoniensis* than to *T. arawatee* I shall refer to it in future as

TRACHYPTERUS JACKSONIENSIS POLYSTICTUS, subsp. nov.

Contour of head and body.—The depth of the body is greatest immediately behind the head, from whence it tapers gradually to the slender rod-like caudal peduncle, which is evenly curved upwards and forwards, and terminates in a blunt point. The abdominal profile is inconspicuously crenated and apparently somewhat sinuous, but the condition of the specimen is not sufficiently perfect to justify me in definitely asserting this latter character. The depth of the body at the base of the pectoral fin is $3\frac{1}{2}$ in the total length.*

The upper profile of the head inclines obliquely backwards from the tip of the snout to the origin of the nuchal crest so as to form an angle of about forty-five degrees with the horizontal axis of the body.

The head.—*Comparative measurements*.—The length of the head† is rather less than its depth and $5\frac{3}{8}$ in the total length; the greatest width of the head is close behind the eye and is one-third of the length.

Jaws.—The premaxillary processes are included within a deep groove which extends backwards to above the middle of the orbit, their length being three-fourths of that of the head. The maxillary is short and broad, its length $2\frac{3}{8}$ in the head, its greatest width a little more than half its length; it is of an exceedingly delicate membranous structure, and is profusely ridged with well developed striæ, which radiate from a point near its anterior margin, most of the rays on the outer side being ramose; it does

* All measurements in which the "total length" forms one of the factors must be looked upon as approximate only since the curvature of the vertebral column posteriorly prohibits absolute accuracy.

† The border of the opercle on each side is greatly frayed so that it is impossible to determine it accurately; I have therefore taken the measurements from the tip of the snout to the middle of the scapular arch.

not extend backwards beyond the anterior border of the eye; the mandibular rami are extraordinarily deep, the hinder and lower borders being of equal length. The mouth is situated on a level with the inferior border of the eye.

Teeth.:—The dentition is imperfect, the only teeth now remaining being a single very strong sharp acutely-conical one on each ramus of the upper jaw, behind which is a much smaller but similarly shaped tooth; no teeth can be detected on the lower jaw.

Eye.:—The eye is very large and round, situated in the middle of the upper surface of the head, its longitudinal diameter being $2\frac{1}{5}$ in the length of the head.

Branchial apparatus.:—All the opercles are ornamented with radiating striæ similar to those of the maxillary, as also is the articular bone; the opercle is of moderate size, and appears to have been produced backwards well beyond the scapular arch; it is bordered below by the enlarged and band-shaped interopercle, which overlaps and almost entirely conceals the small aborted subopercle; the preopercle is crescentic and with the interopercle extends forwards to beyond the vertical from the anterior border of the eye, leaving below the eye a triangular naked space bordered by the hinder margin of the dentary and the preopercle; the branchiostegal rays are six in number, and there are nine gill-rakers—so far as I can ascertain without injuring the specimen—on the lower branch of the anterior arch; they are short, stout, and subclaviform; narrow at the base, compressed and knife-like above, the second (from the articulation) the longest, about $\frac{2}{3}$ of the diameter of the eye.

The fins.—*Dorsal fin*.:—The anterior detached (or semi-detached) portion of the dorsal fin originates a little in advance of the posterior border of the eye and but a short distance behind the termination of the premaxillary groove; it consists of five rays, all of which are broken off at a short distance above the base; the portion of the first ray which is still *in situ* is armed anteriorly with curved spinules, as also is that of the second, but

in a lesser degree.* The second portion is fairly perfect and is composed of 121 rays, the longest of which are inserted well behind the middle of the fin and are about one-fourth longer than the head; these rays are exceedingly slender and fragile; and each ray is provided with a strong basal spine on either side, and with numerous spinules irregularly arranged along its entire length.

Ventral fins :—The ventral is inserted well behind the base of the pectoral, and consists of eight rays, all of which are articulated, the first, however, being considerably stronger than the others, while the last is split into three portions to the very base; all the rays are more or less imperfect, and are quite smooth.

Pectoral fins :—The pectoral is moderately developed and is composed of fourteen smooth rays, the second of which is the longest, about a third of the length of the head; it is inserted somewhat lower than the suture between the opercle and subopercle, in front of the posterior edge of the scapular arch and is directed upwards and backwards.

Caudal fin :—The caudal fin is very narrow at the base and consists of two strong outer rays and five or six slender intermediate ones; the outer rays are quite smooth, without any indication of external spinules; the length of the fin is about three-eighths of that of the head. I am unable to find any indication of a lower caudal lobe, the upper lobe being continued along the same axis as the vertebral column.

Lateral line :—The lateral line originates behind the eye, immediately above the upper angle of the scapular arch, and runs along the middle of the side below the vertebral column to the inferior border of the caudal peduncle, each poriferous area being armed with a short, stout, conical spine.

* So far as can be seen from the remnants these rays were articulated, and it is therefore incorrect to call them spines as is usually done; there is in fact but one dorsal fin, the anterior rays of which are somewhat distinct from the posterior portion, as in some heterosomatous fishes, such as *Notosema*.

Coloration :—Silvery, suffused with a darker gray above, the entire head and body ornamented with numerous well-marked bluish spots.

The specimen measures about 140 millimeters to the base of the caudal fin and was found on the beach near Newcastle.

Comparing this description with those of my predecessors, as referred to in the list which I have given above, we find that (1) in the Auckland Museum specimen the only character of any value for specific distinction mentioned by Hutton is that the dorsal rays number about two hundred.* The few other characters mentioned would, roughly speaking, apply equally well to any member of the genus; this example measured twenty inches.

(2) Hutton's second specimen, of which no details are given, only served to confirm that author in the belief that the New Zealand species was identical with that of the south-eastern Pacific.

(3) With the publication of Clarke's paper we hail the first attempt at an original detailed description of an Australasian *Trachypterus*, and it, therefore, merits more careful analysis. That author was exceptionally fortunate in obtaining his specimen in absolutely perfect condition, the fish, which measured about three and a half inches, having been taken "in a pool at high-water mark" where it "had evidently been embayed on the tide retiring;" it was subsequently placed "in a tin full of sea-water, in which it lived for some short time."

Omitting for the present all reference to the fins, our attention is immediately drawn, on comparing our specimen with Clarke's figure, to the great dissimilarity in the shape of the head and the contour of the body between the two fishes. The almost vertical antero-superior profile of the head in *arawata* is markedly different from that of the New South Wales fish which is inclined backwards at an angle of about forty-five degrees to the longi-

* The importance of this character is denied by McCoy, to whose views I shall have occasion to allude later on.

tudinal axis of the body. The eye is much smaller, being (according to the figure) about one-third of the length of the head; now if the two fishes belonged to the same species we would expect this character to be reversed, the rule being that the younger a fish is the larger the eye is proportionately; it is also situated midway between the upper and lower profiles of the head and much more forward, the cleft of the mouth and the whole of the maxillary being below the level of the eye, and the latter extending backwards to the vertical from its posterior border, whereas in our species the cleft of the mouth is on the same level with the inferior edge of the eye and the maxillary is wholly in front and only partially below it.

The similarity in the number of dorsal rays is sure to attract attention, but the comparative height of the second dorsal is not nearly so great and there is a more pronounced disproportion between the strength of the rays in the two dorsals, so much so as to make me somewhat sceptical as to whether the rays of the first dorsal ever were much produced in the Newcastle specimen. The origin of the first dorsal in *arawatae* is considerably further forward, but this is doubtless in some measure owing to the much greater verticality of the profile and the anterior position of the nuchal crest. Clarke lays considerable stress on the presence of a pair of cutaneous lobes bordering the caudal peduncle above and below, which he views in the light of adipose dorsal and anal fins, but these are merely membranous expansions of the skin due to immaturity and would assuredly not have been noticeable except in the case of such a perfect example as its describer was fortunate enough to possess; they are of no specific value.

The first ventral ray in *arawatae* is spoken of and figured as a spine (V. 1 + 5) and is serrated, in which characters it differs from our fish.

The upper lobe of the caudal fin is inserted almost at right angles to the vertebral axis and the outer rays are serrated externally throughout their entire length, while there is a conspicuous lower lobe consisting of six rays on the same plane as

the vertebral column, the fourth ray being slightly elongate and thus reminding us of *Stylephorus*.

(4) In the Manly fish the contour of the head, the extension of the maxillary, and the position and appearance of the opercles are much the same as in the present fish, as also is the origin of the dorsal fin; the body, however, is much more elongate, but this is due to the age of the specimen, which, I am inclined to believe, is also responsible for the lowness of the dorsal fin. The abdominal profile is straight, but is protected by numerous spinose processes. The length of the head is but little less than the greatest depth of the body, which is far behind the pectoral fins; from this point the depth rapidly decreases into the long and slender tail. The premaxillary groove is very long, about four-fifths of the length of the head. The eye is in much the same position as in the Newcastle specimen, but, as is to be expected in so much older an individual, is proportionately smaller, its diameter being contained $3\frac{1}{2}$ times in the length of the head, the contraction making it appear much lower on the side of the head. In Ramsay's figure a large subopercle is shown, but no such bone is really present, the inter- and sub-opercles being as described above; the ventral tubercle is also behind the base of the pectoral, not below it as stated in his description. The position and state of the specimen unfortunately preclude me from determining whether the dorsal rays were smooth or rough.

(5) Johnston gives no account of the Tasmanian example, contenting himself by copying the fin formula of *altivelis* from Günther, and it is, therefore, impossible to decide as to which species it properly belongs; probably it is best to associate it with the following.

(6) The position of the eye in both of the examples figured by McCoy—one of which, as will be seen by reference to the list given above, is much larger, the other much smaller than ours—is apparently very different from that of the present fish, being behind the middle of the head and separated from the maxillary

by a preorbital space equalling or nearly equalling its diameter, but this appearance is deceptive and is caused by McCoy having unfortunately figured both his examples with the premaxillary extended to its fullest possible length, and given therefore a quite erroneous idea of the aspect of the fish in its natural state, since it is only under special conditions that the mouth is protruded in the manner figured; this is also responsible for the wide space between the termination of the premaxillary processes and the origin of the dorsal fin. In neither of McCoy's specimens is the height of the dorsal rays so great as in ours nor is there any mention made of spinules on the rays; the caudal fin is, however, much longer and there is a distinct basal lobe; the pectoral fin is much smaller, but is perhaps imperfect; in the larger example the first ray of the ventral bears four spines in front near the base, but in the smaller it is smooth as in our fish.

Compared with *arawata* the whole appearance of McCoy's youngest specimen is so different that I have little hesitation in pronouncing them distinct.

Writing of the difficulties which confront the student in any attempt to discriminate between the various forms of trachypterids McCoy makes the following remarks:—

“The relative length of the rays of the anterior portion of the dorsal fin, the caudal fin, and the ventral fins in different individuals is due to the excessive delicacy and fragility of the rays—as fine as the finest hair and as brittle as spun glass.—so that the slightest touch in separating the rays to count them breaks them in pieces. I think also that the young are deeper and shorter in proportion than the old; and, consequently, the specific differences founded on the greater number of times the length of the head or the depth of the body are contained in the total length are not to be trusted for specific characters when the length of the specimens is different. I also believe the numbers of rays in the dorsal fin increase with the length of the body of the individual.”

While agreeing that great alterations take place in the figure of these fishes with increasing age, the labours of Emery and

others having indeed undeniably demonstrated so much, I can not so readily see my way to accepting the suggestion thrown out in the last sentence quoted, since it necessitates an increase in the number of neural spines and a corresponding increase in the vertebræ, in fact a thorough reorganisation of the entire skeletal framework of the fish. I do not know of any instance among the higher forms of animal life where so important a change occurs, and I may be pardoned for doubting its accuracy until some more reliable evidence than has as yet been brought forward is adduced.

But, while admitting that these fishes pass through many and puzzling changes in their passage from youth to maturity, and recognising, therefore, the necessity for exercising the greatest caution in dealing with specimens of different ages but from neighbouring localities, it is equally incumbent on us to guard against falling into the opposite error by carelessly uniting together, on such a plea as the above, what may prove to be very distinct species, sooner than trouble ourselves to sift to the bottom every tittle of evidence which we may be able to accumulate; a slovenly habit which, though unworthy of the name of science, is unfortunately altogether too prevalent.

While, therefore, I am absolutely opposed to the contention of the limited and, I am happy to believe, ever decreasing number of observers who hold that the separation of districts by wide areas of sea and land is no bar to the specific identity of the creatures inhabiting them,* it must be borne in mind that, so far as our present knowledge extends, the conditions which regulate animal life at great depths below the surface of the ocean are everywhere more or less identical, at least so far as temperature, the most important factor affecting the distribution and migration of fishes is concerned; this being so, we know of no obstacle to the cosmopolitan distribution of similar forms. Nevertheless, even here it seems to me that it would be wiser to regard as

* The union of such species as *Squalus acanthias*, *Clupea sprattus*, *Engraulis encrasicolus*, and others with their southern analogues is a case in point.

distinct all species occupying such widely disconnected areas as, for instance, the north-eastern Atlantic and the south-western Pacific, rather than that they should be united together on the insufficient characters deducible from unique and oftentimes imperfect specimens.

Holding these opinions it will not, therefore, be surprising that I shall not attempt to identify our trachypterids with any of those described from the Atlantic and Mediterranean, nor indeed with *altivelis*, though it is quite possible that they belong to that species.* I think, however, there can be no reasonable doubt that the individual described by Ramsay from Manly Beach is the adult form of those so beautifully figured by McCoy from Portland, nor that Hutton's and Johnston's fishes must be placed in the same category with the latter, the dark spots on most of these examples being merely indicative of immaturity.

With *arawatae* and the present fish it is more difficult to deal; the contour of the head, and especially the forward position of the nuchal crest in the former, suggests a second species, for McCoy's smallest example was of much the same size as Clarke's, and yet the profile of the head was inclined backwards at almost as great an angle as in his older fish, and the same remark applies to the anterior position of the origin of the dorsal fin in *arawatae*. As for the Newcastle specimen, which, if not of the same species, is at least closely allied to *jacksoniensis*, I have not found any mention of a *Trachypterus* having the head and body dappled; where the colour markings, if present, are so constant to the same pattern as in these fishes, one is apt to attach greater importance to colour variations than is perhaps warranted by the circumstances of the case. In, therefore, giving the subspecific name *polystictus* to the Newcastle fish I only wish to indicate the existence of such a form, since if a similar variety of other species, such as *arcticus* and *trachyptera*, is known, the value of this as a differential character would be greatly diminished.

* Of *T. semiophorus*, as before stated, I have seen no description, and I am not, therefore, in a position to judge of its affinity to our species.

In the present tentative state of our knowledge I am inclined to synonymise the Australasian species as follows:—

1. *TRACHYPTERUS JACKSONIENSIS*.

? *Trachypterus altivelis* (not Kner), Hutton, Trans. N. Zeal. Inst. v. 1873, p. 264, and viii. 1876, p. 214, and xxii. 1890, p. 281; Johnston, Proc. Roy. Soc. Tas. 1882, p. 123, and 1890, p. 34; Macleay, Proc. Linn. Soc. N.S. Wales, ix. 1884, p. 43; Gill, Mem. Ac. Nat. Sc. Washingt. vi. 1894, p. 120.

Regalecus jacksoniensis, Ramsay, Proc. Linn. Soc. N.S. Wales, v. 1881, p. 631, pl. xx; Macleay, Proc. Linn. Soc. N.S. Wales, vi. 1881, p. 55.

Trachypterus jacksoniensis, Ogilby, Catal. Fish. N.S. Wales, p. 43, 1886.

Trachypterus tænia (not Bloch & Schneider), McCoy, Prodr. Zool. Vict. dec. 13, pl. cxxii. 1886; Lucas, Proc. Roy. Soc. Vict. (2) ii. 1890, p. 32.

Coasts of south-eastern Australia, ? Tasmania, and ? New Zealand.

1a. *TRACHYPTERUS JACKSONIENSIS POLYSTICTUS*.

Coast of New South Wales.

2. *TRACHYPTERUS ARAWATÆ*.

Trachypterus arawatæ, Clarke, Trans. N. Zeal. Inst. xiii. 1881, p. 195, c. fig.; Hutton, Trans. N. Zeal. Inst. xxii. 1890, p. 281; Gill, Mem. Ac. Nat. Sc. Washingt. vi. 1894, p. 120.

Coast of New Zealand.

The former of these species is evidently analogous to the Mediterranean *T. trachyptera*; in reference to the height of the dorsal I am very doubtful as to the expediency of laying much stress on that character; I think it probable that, like the rays

of the ventral and caudal fins, and of its own anterior semi-detached portion, this fin becomes lower with increasing age. In the forward position of the nuchal crest our second species approaches *T. rex-salmonorum*, and stands in a similar position to it that *T. jacksoniensis* does to *T. altivelis*.

In my judgment *arcticus* should be removed from the genus *Trachypterus*, of which the *Cepola trachyptera* of Gmelin is the type,* and be left as the representative of the genus *Bogmarus* of Bloch and Schneider.

* Jordan and Evermann (Check-List, p. 490) give *trachyrhynchus* as the type of *Trachypterus*; I do not know of any such species; possibly it is a misprint.

CONTRIBUTIONS TO A MORE EXACT KNOWLEDGE
OF THE GEOGRAPHICAL DISTRIBUTION OF
AUSTRALIAN BATRACHIA. No. v.

BY J. J. FLETCHER, M.A., B.Sc.

(a) BATRACHIA OF TASMANIA.

The number of species of Batrachia assigned to Tasmania at different times has been as follows:—

1841.—One species (Duméril and Bibron, *Erp. Gén.* viii.; out of a total of eleven species described or enumerated from Australia and Tasmania).

1841.—One species (Mr. J. E. Gray, *Capt. Grey's Journals*, Vol. ii. App., p. 435; out of a total of sixteen—nominally seventeen—species catalogued from Australia and Tasmania, including the preceding).

1858.—Eight species (Dr. Günther, seven—one erroneously, *Crinia georgiana* [App., p. 134] not being a Tasmanian species—including *Pseudophryne bibronii*, in the *Brit. Mus. Catalogue* [1858]; subsequently increased by two species of *Crinia* [P.Z.S. 1864, p. 48]. A second record of *Pseudophryne bibronii* given in *Ann. Mag. N. H.* (3), xx. 1867, p. 55.

1868.—Seven species (Mr. G. Krefft, "Notes on the Fauna of Tasmania," including *Hyla verreauxii*, and a "*Pseudophryne* discovered by Mr. Masters, and probably new"; the remainder are included in Dr. Günther's *Catalogue*, but *L. peronii* therein mentioned only in the Appendix (p. 134) is overlooked). It is to be regretted that Mr. Krefft apparently neglected to place on record the complete list of species obtained by Mr. Masters.

1882.—Seven (? eight) [Mr. A. G. Boulenger, *Brit. Mus. Catalogue*, 2nd ed.]. Mr. Boulenger's revised list, the latest we have,

differs from Dr. Günther's by the exclusion of *Crinia georgiana*, and *Pseudophryne bibronii*, and the doubtful inclusion of *Hyla krefftii*. As Mr. Boulenger had at his disposal only the material utilised by his predecessors, it is evident that for at least thirty years fruitful collecting in Tasmania has been at a standstill, notwithstanding increased travelling facilities.

Through the kindness of two Members of the Society resident in Tasmania I am now enabled to make some additions to the Batrachian fauna. To Miss Lodder, of Ulverstone, my thanks are especially due for seven small consignments forwarded at different times, amounting to forty well-preserved specimens, representing seven species. I am also much indebted to Mr. A. Simson, of Launceston, for an interesting collection of fifteen specimens belonging to five species, all, however, represented in Miss Lodder's collections. Altogether I have examined representatives of seven species, of which four find a place in Mr. Boulenger's edition of the B.M. Catalogue; two (*Limnodynastes dorsalis* and *Crinia signifera*) are now recorded from Tasmania for the first time; and one (*Pseudophryne*) recorded by Dr. Günther and Mr. Krefft, but omitted by Mr. Boulenger, is shown to be correctly included in the Tasmanian fauna.

The number of Tasmanian species at present known, therefore, is ten (nominally eleven). Of these, the only species peculiar to Tasmania is *Crinia tasmaniensis*, Gthr. Excluding *Hyla krefftii*, the remaining nine—or varietal forms of them—occur in Southern Victoria, a condition of things quite in harmony with the views of Professor Spencer and Mr. A. H. Lucas as to the close relationship between the faunas of Tasmania and Victoria. The revised list now offered brings out one other point not previously evident, namely, that, few as the Tasmanian species are, four occur also in South-western Australia, and five in the colony of West Australia.

Much of the British Museum material was collected very many years ago, and, except in one instance (*H. ewingii* from Hobart), the habitats recorded are simply Tasmania or Van Dieman's Land. As the material examined by me is from the north coast or there-

abouts, I am not at present in a position to offer any remarks upon the geographical distribution of the species within the limits of Tasmania. Of the three species which have not come under my notice, two are known from Tasmania only by single specimens in the B.M. Collection, presented (prior to the publication of the first edition of the Catalogue in 1858) by Sir A. Smith, without information as to the collector's name.

CYSTIGNATHIDÆ.

1. *LIMNODYNASTES PERONII*, D. & B.—The only specimen known from Tasmania is one presented to the British Museum Collection many years ago by Sir A. Smith.

2. *L. TASMANIENSIS*, Gthr.—*Hab.*: Longford (Miss Lodder), Launceston (Mr. A. Simson). Seven typical examples with a light vertebral stripe.

3. *L. DORSALIS*, Gray.—*Hab.*: Ulverstone (Miss Lodder). Five specimens, of which four are dorsally spotted, with an incomplete light vertebral stripe; and one is unspotted and unstriped. (See also remarks on p. 675.) Three of these specimens have the vomerine teeth abnormally developed, so as to extend outwards beyond the level of the choanæ.

4. *CRINIA SIGNIFERA*, Gir.—*Hab.*: Ulverstone, Swansea, E. Coast (Miss Lodder); Launceston (Mr. A. Simson). There are also specimens in the Macleay Museum from Tasmania.

5. *C. TASMANIENSIS*, Gthr.—I have not seen an example of this species, which is known only from "several specimens" in the British Museum Collection. It is a smooth-bellied *Crinia* which should be easily recognisable by the following characters:—Toes fringed, subarticular tubercles moderate, two small metatarsal tubercles, upper and lower surfaces smooth; "the lower parts beautifully rose-coloured, largely marbled with black." Vomerine teeth are said to be absent.

6. *C. LÆVIS*, Gthr.—*Hab.*: Ulverstone (Miss Lodder), Launceston (Mr. A. Simson). Previously known only from the single (type) specimen in the British Museum Collection, which must

have been in some respects a somewhat exceptional one, or at least not in perfect condition; though no description based on a single specimen of these variable little frogs can be perfectly satisfactory. The distinctive characters of the species according to the B.M. Catalogue are—vomerine teeth wanting, toes not fringed, subarticular and metatarsal tubercles indistinct, upper and lower surfaces smooth; “brownish-olive above, with small scattered yellow spots; lower surfaces spotted with brown.”

From the examination of a good series of thirteen specimens I find that the description may be amended in several respects, as follows:—Vomerine teeth of the usual character present, seldom missing; ventral surface white with scattered brown or black spots, the “concealed surfaces” black and white marbled (least so, but sometimes slightly, on the backs of the thighs), the white suffused with rosy or rosy-pink all over, or occasionally chiefly about the groin, and the thigh-, knee- and tarsal-joints; but I have not seen a specimen—and I have seen only spirit specimens—without some evident indications of it. Some specimens have the ventral surface more dark-spotted than others, the tendency being for the spots to become larger posteriorly on the ventral surface, as well as on the legs. Some have indications of at least some subarticular tubercles, and occasionally of an inner metatarsal tubercle. Some have a few small scattered warts on the dorsal surface. Some have indications—especially immediately behind the eye—of an incomplete dark streak on each side of the head. Occasionally, as in var. *froggatti*, a specimen is met with showing one or a number of light spots somewhere on the dorsal surface, but not constant in position; they may even be suffused with rosy. One very light Tasmanian specimen has a rosy wash (post mortem ?) nearly all over the upper surface.

When these characteristics are allowed for I am prepared to admit that the Victorian frog described by me as *Crinia froggatti* (P.L.S.N.S.W. (2) vi. 1891, p. 275) is at most only a continental variety of *C. lævis*. The largest of the Victorian specimens (26 mm. from snout to vent) are somewhat smaller than the largest Tasmanian specimens (30 mm); the concealed surfaces are somewhat

more extensively marbled with an intenser black, the rosy or carmine suffusion brighter (even in specimens which have been in spirit for six years); with more pronounced indications of a broad, dark dorsal band commencing between the eyes, and of the dark stripe on each side of the head. As in the Tasmanian examples, vomerine teeth are but seldom missing.

Of *Crinia victoriana*, Blgr., (also originally described from a single specimen) I have now a good series, for which I am indebted to the kindness of Mr. Hugh Copeland, Junr., late of Warragul. This is another smooth-bellied form, without fringed toes, with indistinct subarticular and metatarsal tubercles, and with vomerine teeth. It is readily distinguishable to the eye, but it is very difficult to formulate any satisfactory distinctive differences other than those of colour and pattern. In details the specimens differ among themselves in both these respects, and yet there is usually no difficulty in distinguishing them from examples of *C. levis*, var. *froggatti*. The suffusion on portion of the concealed surfaces is more restricted, and is of a different tint, coppery or coppery-red; and a very characteristic arrangement is some modification of a single subcircular coppery spot with a lighter central portion on each loin; occasionally the back and front of the thighs, or even the ventral surface, may show a wash of it. Some specimens exhibit a fairly complete broad dark (brown or black) dorsal band commencing between the eyes; more often the anterior transverse [the "black transverse band between the eyes" of Mr. Boulenger's description] and the lateral margins are indicated, but with much of the central portion missing, or the whole band is represented only by blotches and streaks, the general effects produced being grey or brown variegated with black. Lower surface dark-spotted on a light ground (sometimes with a bluish tinge) which is itself minutely dark-spotted, sometimes very much so, especially on the throat; sometimes the large dots are wholly wanting or nearly so, particularly on the throat; or sometimes sparsely light-spotted or with patches of coppery, the flanks often much dotted; "vent in a large triangular [often light-edged] black spot," frequently continued on each side as a dark band on the

lower portion of the back of the thighs; concealed and lower surfaces of the legs much marbled or spotted with black. Usually there are indications of a dark streak on each side of the head, commencing on the snout, most conspicuous immediately behind the eye. Light or whitish spots—one or several—sometimes occur in a casual manner on the upper surface of the body or limbs.

BUFONIDÆ.

7. *PSEUDOPHYRNE BIBRONII*, Gthr.; *var. SEMIMARMORATA*, Lucas.—*Hab.*: Ulverstone (Miss Lodder); Launceston (Mr. A. Simson). Three specimens, intermediate in character between ordinary examples of *P. bibronii* and the extreme form of the Victorian variety which Mr. Lucas has described as *P. semimarmorata*. The three Tasmanian specimens are very like some Victorian examples I have seen, portion of a number kindly given to me by Mr. Lucas, and have the throat, or all but a little patch near the symphysis, marbled like the ventral surface. From the presence of these and other intermediate forms I am constrained to regard *P. semimarmorata* as not entitled to more than varietal rank. I have not seen any specimens partially marbled on the lower surface except from Victoria and Tasmania; and it was probably to specimens like mine that Mr. Krefft's remark, already quoted, applied.

HYLIDÆ.

8. *HYLA PERONII*, D. & B.—The only specimen known from Tasmania is one presented to the British Museum Collection many years ago by Sir A. Smith.

9. *H. EWINGII*, D. & B.—*Hab.*: Ulverstone (Miss Lodder); Launceston (Mr. A. Simson). This is a very interesting species, with several well-established varieties. The older naturalists were not in a position to appreciate the real state of the case, for their observations were based on the examination of single specimens, or of too scanty series from only a portion of the area over which the species is now known to range. Under such circumstances it is hardly surprising that probably no less than

four species have been founded only on variable or abnormal specimens of *H. ewingii*.

Mr Boulenger, with a series of only about seventeen specimens for reference (10 from Tasmania, 1 from Melbourne, 4 from Australia, and 2 of var. *calliscelis* from King George's Sound), was the first to recognise and allow for a considerable amount of variation. His predecessors without exception had reported the fingers of *H. ewingii*, even of Tasmanian specimens, to be free or quite free. Steindachner and Keferstein had, however, only a single specimen apiece from New South Wales, and in these it is possible that the fingers were free. The French naturalists also attached unnecessary importance to the presence or absence of "tubercules cutanés." The size of the tympanum in relation to that of the eye is likewise variable. Mr. Boulenger made some necessary allowances in these respects, and then proceeded to reduce *H. calliscelis*, Peters, to the rank of a colour-variety of *H. ewingii*. These were important steps in the right direction. But Mr. Boulenger had no specimens, except of the so-called *H. krefftii*, from New South Wales, otherwise he might, with advantage, have gone even further, as I feel impelled to do as the result of the examination of a fine series of more than one hundred specimens from three colonies.

Of seventeen Tasmanian specimens* all but two have a quite noticeable rudiment of web on the fingers, more pronounced in some specimens than in others. The unwebbed portions may or may not, or be partially fringed; if the fringe is present the rudiment of web between two adjacent fingers, may become continuous with it. Sometimes the rudiment of web between the 3rd and

* Ten Tasmanian specimens of *H. ewingii* from an unspecified locality, kindly forwarded to me by Mr. Alex. Morton, have not been taken into account. They were forwarded in a cardboard box, and were so crushed and dried up in the mail bag in transit as to be for the most part irretrievably spoilt as specimens. As far as I can judge they are very much like the other Tasmanian specimens I have examined, and among them is one which under more favourable circumstances would have been a good example of var. *calliscelis*.

4th fingers appears to be most pronounced, and then the 3rd digit is more or better fringed on that side than on the other. In two specimens the fingers are not so well fringed nor is the rudiment of web so much developed as in the others; they appear to be only examples of the typical form of *H. ewingii* with the fingers and toes less fringed and webbed than usual. The seventeen specimens are separable into two groups: one of twelve specimens to which the description of the colour-pattern given in the B.M. Catalogue (2nd ed.) applies very well; and a group of five specimens in which, irrespective of sex, the groin, loins, backs of the thighs, or sides of the body, or some of these, show some dark spots or streaks not provided for in the description. But the members of the second group have not the fingers and toes any less webbed than those of average specimens of the first. Accordingly I should call the individuals of the first group typical examples of *H. ewingii*; some of the others I should call a trivial colour variety, of no great importance by itself; but at least three of them, in which the spots are not merely brown like the ground colour of the back, but blackish or bluish-black, are quite entitled to be called var. *calliscelis*. One of these last shows a dark streak on each side of the body (interrupted on one side) anteriorly joining the dark streak on the temporal region, and posteriorly bending round to join the dark dorsal band. In some New South Wales specimens a row of spots is seen in a similar position. In the specimen referred to, as in other Tasmanian examples, the region of the dark dorsal band is not merely a good deal speckled with blackish, but it is decidedly edged with it laterally and anteriorly.

In a series of thirty Victorian specimens from one locality, more uniform in colour than the Tasmanian specimens, the fingers have a noticeable rudiment of web as in most of the Tasmanian examples; twenty are unspotted; five have one or several small dark (ground-colour) spots on a yellow back ground on the backs of the thighs, and one has a few dark spots on one side about the flanks. Of a second series of seven specimens from another locality, three are unspotted and the rest are slightly spotted on

the backs of the thighs. Finally a single specimen from another locality (Mt. Lofty, Vic.) kindly given to me by Mr. Frost, has a bluish-black spot in the groin extending on to the loins, or on one side with a separate spot on the loins, and a blackish spot and some brown markings on the back of each thigh. The last of these I should call a good example of var. *calliscelis*; the others typical examples of *H. ewingii*, or a trivial colour-variety.

An extensive series of New South Wales specimens from various localities on the coast and on the tablelands is separable into two or three groups: one of unspotted specimens with a distinct rudiment of web, in some I think not appreciably more in amount than in average Tasmanian and Victorian specimens, in others a little more (*H. krefftii*, so-called); a second group in which one or two large dark spots, or a group of smaller ones, are present on the sides of the body or the backs of the thighs, but more often and constantly on the loins; and a third group in which in addition the back and the sides, or the upper surface of the limbs, are heavily blotched, streaked or spotted, but not uniformly or to the same extent in a series of specimens from the same locality. Now the webbing of the fingers of the spotted New South Wales examples certainly varies in amount from very little indeed to nothing. I have some specimens whose fingers I should call free; and others of which one can say that they are slightly fringed or have a just recognisable rudiment of web, and that is about all. They are certainly appreciably less webbed than either the unspotted specimens, or than average Tasmanian and Victorian specimens. Such rudiment of web as there is seems to be merely the continuation right round of the slight fringe of adjacent fingers, or, in other words, of the junction of the fringes of two adjacent fingers. But in var. *krefftii*, as in average Tasmanian and Victorian specimens, there seems to be in addition a slight development of web as well.

What is true of the fingers, applies also to the toes, the webbing of the latter varying in amount directly as that of the fingers.

Professor Spencer in the Report of the Horn Expedition (Part ii. Zoology, pp. 157 and 167) has discussed the question of the

value of the *amount* of the webbing as a generic and specific character; and he adduces instances of variation in the amount in the same species (*Chiroleptes platycephalus*, and *Heleioporus pictus*). I have also pointed out a similar state of things in Mixophyes. Similar variations are presented by *Hyla caerulea* and *H. peronii*, as, for example, when specimens from the moist subtropical Northern River Districts are compared with others from the drier inland districts. Dr. Günther and Mr. Boulenger have allowed for variation in this respect in some of their descriptions. Dr. Günther says of *Pelodryas* (*H. caerulea*), "fingers one-half or one-third webbed"; and of *H. peronii*, "fingers one-fourth webbed. Mr. Boulenger says of the latter, "fingers half-webbed or nearly so," though even this is an insufficient margin; and of *H. rubella*, "fingers free or with a slight rudiment of web; toes two-thirds or three-fourths webbed." *H. ewingii* is simply another addition to the list of species in which the amount of the webbing of the fingers and toes is not a constant quantity. When allowance is made for this, then *H. krefftii* falls into, what I believe is, its proper place as the eastern coastal representative of the typical form of *H. ewingii*. If *H. ewingii* may comprehend var. *orientalis*, which is less webbed, it would obviously be illogical to exclude a variety (var. *krefftii*) because it may be a little more webbed; for according to the B.M. Catalogue (2nd ed.) *H. krefftii* is "very closely allied to *H. ewingii*, but differing in the more distinct web between the fingers, and the more extensive web between the toes, it reaching the discs of the third and fifth."

The difficulty in the way of finding a satisfactory general expression for a quantitative estimation of the web is that all the digits, and sometimes the two sides of the same digit, are not relatively equally webbed, and also that their unwebbed portions are or may be fringed, the true web then being reinforced by the fringe if well developed. It is thus to some extent a question of whether fringe is to count as web. If so, but not I think otherwise, then in some specimens of var. *krefftii*, as Mr. Boulenger says, the webbing may extend to the discs of the 3rd and 5th toes, or more often only to that of the 5th. That being so, how-

ever, I cannot see that a similar statement is not equally applicable to some Tasmanian and Victorian specimens of *H. ewingii*. The following is I think a fair estimate of the webbing of *H. ewingii* and its varieties:—Fingers free, fringed, or fringed and with a rudiment of web. Toes: the third and fifth webbed to about the level of the subarticular tubercle immediately proximad of the disc, or beyond and by continuity with the fringe extending to the discs or nearly so: the other toes less webbed.

I have not seen specimens of var. *calliscelis* from South-West, or South Australia, but it seems to me that the case for *H. ewingii* may be summed up as follows:—

In Tasmania we find the typical unspotted form of *H. ewingii*, together with a slight and unimportant colour-variety, and var. A.—var. *calliscelis*.

In Victoria also we find the typical form, together with a trivial colour-variety, and var. *calliscelis*, the latter also extending to South Australia (Peters' two Adelaide types of *H. calliscelis*) and to West Australia (two specimens from King George's Sound, in the British Museum, previously recorded by Dr. Günther under the name of *H. ewingii*).

In New South Wales we find an unspotted form with the fingers and toes as much or even slightly more webbed than the typical form (var. B.—var. *krefftii*); and a more widely distributed spotted variety, less webbed than the typical form (var. C.—var. *orientalis*, var. nov.), and in which the discs of both the fingers and the toes are certainly smaller than usual.

Var. *krefftii*—but not *H. ewingii*—is recorded in the B. M. Catalogue (2nd ed.) from Port Denison, Q. In New South Wales it is rather a rare frog, and is confined to the coast. I have seen altogether about twenty-five specimens from three localities all within a distance of about 60 miles from Sydney. The majority were found under logs in the cold months, but a few under loose bark on tree trunks or between the bases of the fronds of *Zamia*. Mr. Krefft's favourite locality for this species near Randwick has been devastated during the last few years; and it is now difficult to procure specimens near Sydney. Var. *orientalis* is one of our

commonest frogs on the coast and on the table-lands, and, as far as my experience goes, is strictly terrestrial in its habits. The most southerly record for it known to me is the Mt. Kosciusko Plateau, whence I have a single specimen which is as strikingly blotched and streaked as some of those from Lucknow; and yet these much-spotted specimens are not altogether devoid of a trace of web on the fingers. It may be noted, however, that both the localities mentioned are west of the Dividing Range.

On a previous occasion I recorded a Victorian specimen which in life had a good deal of bright green about the upper surface. If other specimens like it can be found, this might very well be treated as another colour-variety. The green soon faded in spirit, and the specimen now looks very like some of the ordinary light coloured specimens. New South Wales specimens vary from light silvery grey to dark brown, the back and front of the thighs yellow in the breeding season; but I have never seen a living specimen with any indication whatever of a green tint on any part of the body.

The list of Australian frogs is still undesirably cumbered with species known only from single specimens, which need rediscovering or the correct determination of their alliances. Mr. Boulenger has endeavoured to deal with some of them; but there is still a considerable balance, of which doubtless some will be rediscovered in time, but others, I cannot help thinking, have been founded only on variable, imperfectly preserved, or abnormal individuals.

H. calliscelis, Peters, and *H. krefftii* being provided for, some consideration may be devoted to the claims of *H. verreauxii*, A. Dum., and *H. parvidens*, Peters. The first of these was described from New Holland by A. Duméril in 1853, in the belief that while it was allied to *H. ewingii*, and agreed with it in having the fingers free, it was yet specifically different by its smooth back, and its system of colouration. The first of these characters is of no importance. As to the second, if *H. verreauxii* is entitled to any consideration at all, it is at the most only as a colour-variety of *H. ewingii* in which there is absent "une bande noire étendue de la narine à l'épaule, et bordée, en dessous, par une

ligne jaune très fine et plus courte," which, he says, is always present in *H. ewingii*. The colouration of preserved specimens of *H. ewingii* differs within such considerable limits, according as the individuals were exposed to strong light or were taken from or kept in a dark place before preservation; according also as whether the dark dorsal band commencing between the eyes, and the canthal and temporal streaks are very dark or very faint, or whether the head and back are speckled all over with blackish as may or may not be the case, &c., that A. Duméril's supposed differences carry little weight. The only small Hylas known to us at the present day with a colouration at all like that of *H. ewingii*, and for which from a casual inspection it might be perhaps be mistaken, are *H. rubella*, *H. dentata*, and possibly *H. adelaidensis*; but an examination of the vomerine teeth of the first two, and the details of the colouration of the third, alone would prevent any misconception. *H. verreauxii* was in all probability founded on smooth specimens of *H. ewingii* which were bleached, or faintly and unusually coloured: in which case the name is an absolute synonym of *H. ewingii*. The only other alternative seems to be that *H. verreauxii* is a colour-variety of *H. ewingii*, which has yet to be rediscovered, and of which only the types have ever been seen. Mr. Krefft was certainly mistaken in supposing that he had identified *H. verreauxii*, A. Dum., as common at Sydney, or the Clarence River; in both cases I think he possibly confounded it with *H. dentata*, at that time imperfectly known, as neither *H. ewingii* nor any of its varietal forms has yet been recorded from the Clarence or Richmond Rivers.

H. parvidens, Peters, was founded in 1874 on a single specimen from Port Phillip, but is still unknown to Victorian naturalists. Admittedly it differs from *H. ewingii* chiefly in respect of the smaller tympanum (one-third the diameter of the eye), and the slightly developed vomerine teeth. Since from the examination of only about seventeen specimens Mr. Boulenger found it necessary to allow for a variation in the size of the tympanum of from "one-half to two-thirds that of the eye," it seems to me that it need not be a matter for any surprise if, when a more representative

series were examined, it should be found that this allowance was insufficient. As a matter of fact some of the Victorian and other specimens do seem to have a smaller tympanum than usual, about one-third that of the eye. One such specimen is of especial interest, inasmuch as the vomerine teeth are normal on one side, but absent on the other. Of two other Victorian specimens one (half-grown) appears to have the vomerine teeth not perceptibly developed; the other has them on one side strongly developed, on the other only slightly. Other instances of abnormal vomerine teeth, not including *Crinia*, have come under notice. In three only out of six or seven species of *Limnodynastes* do the vomerine teeth normally extend outwards beyond the choanæ. Three out of my four Tasmanian specimens of *L. dorsalis*, and three out of four variegated Sydney specimens of the same species have the vomerine teeth even more extensively developed than in specimens of those species in which the extension beyond the level of the choanæ is normal. If *L. dorsalis* were known only from unspotted specimens with normal vomerine teeth, and spotted or variegated examples like all but one of mine were then discovered, it would be a very pardonable supposition in the absence of intermediate forms that two distinct species were really represented. *H. parvidens* is known only from a single example, which may very well have been only a light-coloured specimen of *H. ewingii* without definite bands or streaks, with imperfectly developed vomerine teeth, and with a smaller tympanum than usual; and if so the name *H. parvidens* would become an absolute synonym of *H. ewingii*.

9 bis. *H. KREFFTII*, Gthr.—Mr. Boulenger's doubt is not as to the identity of the species but as to the correctness of the locality label. My experience would lead me to suppose that Mr. Boulenger probably had a Tasmanian example (especially if collected by Dr. Milligan) of *H. ewingii* a little more webbed than he was accustomed to see.

10. *H. AUREA*, Less.—*Hab.*: Burine, Emu Bay (Miss Lodder). Three specimens with a light vertebral stripe, as is common in western examples.

(b) THE BATRACHIA OF WEST AUSTRALIA.

The number of species assigned to West Australia at different times has been :—

1841.—One species (Duméril and Bibron, *op. cit.*)

1841.—Six species—nominally seven, *H. bioculata* and *H. adelaidensis* being treated as distinct—(Mr. J. E. Gray, *op. cit.*).

1858.—Nine species—nominally ten, *Myobatrachus* and *Chelydobatrachus* being treated as distinct—(Dr. Günther, *op. cit.*).

1867.—Five additional species either from Mr. Duboulay's collection or forwarded by Mr. Krefft (Dr. Günther, *Ann. Mag. Nat. Hist.* (3), xx., p. 53). Total, fourteen species.

1882.—Fourteen species (Mr. Boulenger, *op. cit.*). That is to say, without additional material, Mr. Boulenger's revised list of species practically differs from Dr. Günther's only by the recognition of *Myobatrachus* and *Chelydobatrachus* as identical, and the substitution of *Pseudophryne guentheri*, n.sp., for *P. bibronii*.

Of these fourteen species I have seen representatives of nine, together with examples of six others not previously recorded, one of which does not quite satisfactorily agree with the description of any known species. For the data on which my observations are based I am largely indebted to Messrs. E. P. Richards, H. Richards, R. Helms, and especially to Mr. A. M. Lea, who have most kindly taken some trouble to collect and forward specimens to me. By the courtesy of Mr. Masters, Curator of the Macleay Museum, I have also been able to examine the specimens collected by Mr. Froggatt in the neighbourhood of King's Sound in 1887, part of the general collections referred to by Sir William Macleay (P.L.S.N.S.W. [2], ii. p. 1017). And by the kindness of Professor Baldwin Spencer, of Melbourne, I have been able to see the specimens brought back by the Calvert Expedition, which were collected by Mr. G. A. Keartland while stationed at the junction of Fitzroy River and Margaret Creek, about 150 miles from Derby.

The number of species at present assignable to West Australia is twenty; but one or two of these need confirmation.

In the following list, for the sake of completeness, the localities recorded in the B. M. Catalogue are given within square brackets :—

CYSTIGNATHIDÆ.

1. LIMNODYNASTES DORSALIS, Gray.—*Hab.* : [West Australia, Houtman's Abrolhos], Perth (Mr. H. Richards), Geraldton (Mr. A. M. Lea). The difference in the colour pattern of eastern and western specimens of this species is very striking. Six western specimens are very fairly represented by Gray's figure of the type (Eyre's Journals, Vol. i. App. p. 405), in which the dorsal surface shows rather large irregular insuliform dark spots, and a white vertebral stripe. The common eastern form is almost uniformly dark, without spots (except light ones on the outlying parts), and without a vertebral stripe, and is very fairly represented (but the back and head are rather light) by Steindachner's figure (Reise Novara, Amphibia, t. ii. fig. 11, under the name of *Heliorana grayi*). This is the common widely distributed eastern form, but with it in the neighbourhood of Sydney—whence come all the New South Wales specimens I have seen—there occurs a variety of a smaller size, in which the back is usually more or less variegated with lighter without the dark ground colour being broken up into definite spots, and with a more or less complete light vertebral stripe. In Victoria also there are two varieties, of which I have seen only the unspotted variety, from Warragul. Sir Frederick McCoy has figured a specimen of the variety with a variegated dorsal surface showing incomplete spots (Prod. Zoology of Viet. Dec. v. Pl. 42, fig. 2) under the name of the Common Sand-Frog, between which and specimens more like that figured by Gray he says there are intermediate varieties. Of five Tasmanian specimens in my possession, one is unspotted and unstriped, and four are spotted, with an incomplete vertebral stripe. In the spotted forms the spots are smaller and more numerous, but not quite so definitely marked as in the western specimens, and the vertebral stripe is not so complete. The point to which I wish to direct attention is this. Tasmanian examples show a fairly established differentiation into a spotted variety, with

at least an incomplete vertebral stripe, and an unspotted variety without a dorsal stripe. In Victoria the differentiation seems to be equally well established. In Western Australia there seems to be only the spotted variety, but in this the pattern has become more definite and accentuated, and the vertebral stripe more striking. In New South Wales we get commonly an unspotted variety, and more rarely a variegated but not satisfactorily spotted variety.

2. *LIMNODYNASTES ORNATUS*, Gray.—*Hab.* : Junction of Fitzroy River and Margaret Creek (Calvert Expedition; two specimens).

3. *CRINIA GEORGIANA*, Bibr.—*Hab.* : [King George's Sound]; Mt. Barker, and Bridgetown (Mr. A. M. Lea; two specimens); Pipe Clay Creek, near Jarrahdale (Mr. E. P. Richards; two specimens). Of the four specimens two are adult, and two less than half-grown. One adult has vomerine teeth; in the other they are present on one side only. Of the juveniles one has vomerine teeth; in the other they are altogether missing. No two of the specimens are exactly alike in colour and pattern. In the two adults and in one young one (without vomerine teeth) the concealed surfaces for the most part have the usual carmine suffusion. The young one with vomerine teeth has the chest and throat dark-spotted in an unusual manner; and is entirely without the carmine suffusion, yet it is not a smaller specimen than the other which has it. One adult (♂) has the throat dusky. One adult and one young one have a light transverse line with a pinkish tinge on the back of the thighs, and a fine light vertebral line ending at the vent. No perfectly satisfactory account of this interesting species can be given without a good series of specimens.

4. *CRINIA SIGNIFERA*, Gir.—*Hab.* : [Abrolhos, and West Australia]; Mt. Barker, Donnybrook (= Preston), Bunbury, Newcastle, Perth, and Jarrahdale (Mr. A. M. Lea; twenty-seven specimens). Not less variable than, and with analogous variations to, the eastern form, including a smooth-backed variety, which seems hitherto to have escaped record.

5. *CRINIA LEAI*, sp. nov.

Allied in some respects to *C. tasmaniensis*, but differing by the presence of vomerine teeth, and of only one (the inner) metatarsal tubercle; in some respects also to *C. laevis* and *C. victoriana*, but differing by a tendency to fringed toes, and to better defined sub-articular and metatarsal tubercles; and differing from all of them in the details of colouration, especially of the ventral surface, and in the absence (apparently constant) of rosy or coppery suffusions from the concealed surfaces.

Vomerine teeth of the usual character generally present. Snout rounded; nostril a little nearer to eye than to tip of snout; tympanum hidden. First finger shorter than second; toes sometimes fringed, sometimes not; subarticular tubercles on the whole fairly distinct, not so conspicuous on the fingers; a small inner metatarsal tubercle. Upper and lower surfaces, except for a small granulate area on the backs of the thighs close to the median line, smooth. Blackish-grey (in one specimen very much lighter than usual), a broad dorsal black (in the light specimen olive-brown) often light-edged band commencing between the eyes, extending backwards nearly to the vent, bifurcate posteriorly to a varying extent, sometimes for more than half its length [in three specimens the band is represented only by a transverse mark between the eyes, or by this and some dorsal spots]; indications of a dark streak on canthus and snout; upper lip with a few dark spots; a dark spot immediately behind eye, and one or two over shoulder; upper surfaces of limbs sometimes transversely dark-barred; vent at the apex of a triangular dark, often light-edged, spot extending on each side a little way along the lower edge of the back of the thighs; lower surface of tarsus, metatarsus, and toes black, usually light-edged; lower surfaces closely and minutely dark-dotted (brown) all over except for a number of small scattered unpigmented areas which show as light specks, sometimes with a bluish tinge. Largest specimen 29 mm. from snout to vent.

Hab.—Bridgetown (Mr. A. M. Lea; seven immature specimens); Pipe Clay Creek, near Jarrahdale (Mr. E. P. Richards; three specimens). Mr. Richards kindly sent off his three speci-

mens alive; but unfortunately they died in transit, and by the time they reached me two (the largest specimens I have seen) had deteriorated considerably, the condition of one of them being beyond repair. I hope at some future time to be able to supplement the above description from the examination of more satisfactory adult material than I have yet seen.

The discovery of this West Australian smooth-bellied *Crinia* is very interesting, as its allies are exclusively Victorian and Tasmanian. I do not propose at present to discuss the propriety or otherwise of including all the smooth-bellied *Crinias* under a single comprehensive species. It is a question which can only be discussed with profit when good series of all of them can be compared; and at present one, *C. tasmaniensis*, is known only from the types in the British Museum. The species are very variable, and some characters which in other genera are available for classificatory purposes are here of negative importance only.

6. *HYPEROLIA MARMORATA*, Gray.—*Hab.*: [West Australia; one specimen (the type)]. The occurrence of this species needs confirmation, the only other localities recorded for it being in New South Wales and Queensland.

7. *CHIROLEPTES AUSTRALIS*, Gray.—*Hab.*: [Nicol Bay; one specimen].

8. *CHIROLEPTES ALBOGUTTATUS*, Gthr.—*Hab.*: King's Sound, and Derby (Macleay Museum, collected by Mr. W. W. Froggatt); Junction of Fitzroy River and Margaret Creek, N.W. A. (Calvert Expedition). The species most numerous represented in both collections (more than twenty specimens).

9. *CHIROLEPTES BREVIPALMATUS*, Gthr.—*Hab.*: King's Sound, N.W.A. (Macleay Museum; collected by Mr. W. W. Froggatt); Junction of Fitzroy River and Margaret Creek (Calvert Expedition).

10. *HELEIOPORUS ALBOPUNCTATUS*, Gray.—*Hab.*: [Swan River, W. Australia, and N.W. Australia]; Perth (Messrs. H. Richards, and A. M. Lea; two specimens); Albany (Mr. R. Helms; one specimen). This is another species which, like *L. dorsalis*, presents a spotted and an unspotted variety. One with white dorsal spots,

two (juv.) without. The first of these is a breeding male in fair condition. In this species, as in the eastern frog described by me as *Philocryphus* (but which, if the generic definition of *Heleio- porus* be amended in respect of the tympanum, I am now prepared to merge in the latter), the most striking secondary sexual (δ) character is the presence of black horny conical tubercles on the upper surface of one or more of the fingers of each hand, much the largest of which is the proximal one on the first finger. This, unlike the small ones, has a bony core. Under some circumstances, possibly after the breeding season is over, the black horny capping of this tubercle, and the small coreless tubercles altogether, are shed. The only male in the B.M. Collection—the type figured by Gray—is in this condition, the description reading, “male with a conical tubercle on the inner side of the first finger.”

H. pictus differs from both *H. albopunctatus* and *H. flavoguttatus*, and resembles the species of *Limnodynastes*, in having only blackish rugosities on the first and second fingers of both hands. In *H. flavoguttatus* there may be from seven to ten or fewer (the number is not constant) black tubercles on the first, second, and third fingers of each hand. A fine male which I kept in captivity for some months was well provided with tubercles when I caught him; but on examining him after death I found that all the small tubercles, and the black capping of the two large ones, had disappeared, leaving only the bony core of each of the latter. In my single male specimen of *H. albopunctatus*, the first finger of the left hand has only the large tubercle; the first finger of the right hand has three, the large proximal one, and two small ones: these are all there are, but under favourable circumstances probably more may be present.

BUFONIDÆ.

11. *PSEUDOPHRYNE AUSTRALIS*, Gray.—*Hab.*: [Swan River one specimen only (the type)]. The only specimen known from West Australia was presented to the British Museum by Mr. J. Wright in 1835. Confirmation of the occurrence of the species in West Australia is therefore very desirable. If correctly attri-

buted to West Australia, then, among Australian Batrachia, it offers perhaps the most remarkable case of discontinuous distribution. In Eastern Australia its distribution is somewhat restricted, so that it might be called rather a local species. I have taken specimens as far north as Gosford, as far west as Mount Victoria, and as far south as Illawarra, all within a radius of about 70 miles from Sydney, and in intermediate localities; but outside the area mentioned there is no evidence at present of the occurrence of the species in New South Wales, or in any other of the colonies save West Australia (for Mr. Wright's specimen in the B.M. Collection; and for two specimens collected by the Elder Expedition at the Fraser Ranges, but which I cannot help thinking were recorded by mistake for *P. guentheri* [possibly without specimens for comparison]).

12. *PSEUDOPHRYNE GUENTHERI*, Blgr.—*Hab.*: [Swan River, and N.W. Australia]; Mt. Barker, Newcastle, Perth (Mr. A. M. Lea; seventeen specimens); King George's Sound (Macleay Museum). The two well-developed metatarsal tubercles on each foot are very characteristic, and call to mind those of *Myobatrachus*, and inland (N.S.W.) specimens of *Hyperolia*. They are probably of effective use in burrowing.

13. *MYOBATRACHUS GOULDII*, Gray.—*Hab.*: [W. Australia, Houtman's Abrolhos, and Swan River]; Perth (Mr. A. M. Lea). Five young specimens (about 17 mm. from snout to vent) about the same size, but very much smaller than that figured by Gray. In the B.M. Catalogue (2nd ed.) *Myobatrachus* is said to have the pupil erect. In my specimens I should call the pupil horizontal. Mr. Lea kindly informs me that he found the specimens at the side of a Termite nest, while rooting about in search of Termite parasites and messmates. He says: "The termitarium looked like a tree-nest which had fallen and become imbedded in the ground. The outer portions of the nest were disused and rotten; and living in, or close at hand, and apparently subsisting upon, the decaying matter, were numbers of the larvæ of a common fly. Several hundred larvæ and pupæ were obtained, and among them at intervals, and at a depth of 2.5 inches from

the surface, were found the five toads forwarded to you. The dipterous larvæ probably supply them with food." Possibly also *Myobatrachus*, like the Indian *Cacopus*, is normally a termite-feeding species. The habits, and especially the breeding habits, of this interesting species are well worth investigation. Mr. Lea also adds: "When alive the abdominal surface is marked with many small greyish irregular spots, especially at the sides, which seem to disappear in spirit." Four of the specimens show to a varying extent a fine light vertebral line (not extending on to the head); one of them is dorsally more dark-spotted than the others.

HYLIDÆ.

14. *HYLA CÆRULEA*, White.—*Hab.*: [Nicol Bay; one specimen] Junction of Fitzroy River and Margaret Creek, N.W.A. (Calvert Expedition; one specimen).

15. *HYLA PERONII*, Bibr., and var. *ROTHII*, DeVis.—*Hab.*: King's Sound (Macleay Museum; several specimens collected by Mr. W. W. Froggatt).

16. *HYLA RUBELLA*, Gray.—*Hab.*: [Nicol Bay, Abrolhos; one specimen from each].

17. *HYLA EWINGII*, D. & B., var. *CALLISCÆLIS*, Peters.—*Hab.*: [King George's Sound; two specimens].

18. *HYLA ADELAIDENSIS*, Gray.—*Hab.*: [West Australia, and King George's Sound]; Perth (Messrs. A. M. Lea and H. Richards; ten specimens); Albany (Mr. R. Helms; one specimen).

19. *HYLA AUREA*, Less.—*Hab.*: [King George's Sound, Swan River, and W. Australia]; Perth (Messrs. H. Richards and A. M. Lea; numerous specimens); Donnybrook (Mr. A. M. Lea); near Pipe Clay Creek, Jarrahdale (Mr. E. P. Richards).

20. *HYLA LATOPALMATA*, Gthr.—*Hab.*: King's Sound (Macleay Museum; one adult collected by Mr. W. W. Froggatt); Kimberley, N.W.A. (Mr. R. Helms; four specimens, not quite half-grown). This species occurs on both sides of the Dividing Range in New South Wales; but the only other record for it is Port Denison, Q.

The localities mentioned in the foregoing list lie either to the north and north-east of Geraldton, or to the south-west and south

of Nickol Bay. Of the Batrachia inhabiting the considerable interval between Geraldton and Nickol Bay we are quite ignorant. In the present state of our knowledge the western species may then be arranged in two geographical subdivisions, a south-western group, and a north-western group. Where, or to what extent, these two faunas overlap or commingle we do not know. Our knowledge of both of them, and especially that of the north-west must be very far from being complete, for three south-western species occur also at Port Essington without being known as yet from any intermediate locality.

(a) The south-western group :—

Limnodynastes dorsalis, *Crinia georgiana*, *C. signifera*, *C. leai*, *Hyperolia marmorata* (?), *Heleioporus albopunctatus*, *Pseudophryne australis* (?), *P. guentheri*, *Myobatrachus gouldii*, *Hyla rubella*, *H. ewingii* var. *calliscelis*, *H. adelaidensis*, *H. aurea* (11 + 2 ?).

(b) The north-western group :—

Limnodynastes ornatus, *Chiroleptes australis*, *C. alboguttatus*, *C. brevipalmatus*, *Pseudophryne guentheri*, *Hyla caerulea*, *H. peronii* and var. *rothii*, *H. latopalmata* (8).

It is convenient to add here for comparison a list of the species known from the Northern Territory (Port Essington and the Daly River), compiled from the B.M. Catalogue, with the addition of *C. dahliei*, recently described by Mr. Boulenger from the Daly River (P.Z.S. 1865, p. 857) :—

Limnodynastes dorsalis, *L. ornatus*, *Crinia georgiana*, *Chiroleptes australis*, *C. dahliei*, *Heleioporus albopunctatus*, *Hyla freycineti*, *H. nasuta*, *H. rubella*, *H. peronii*, *H. adelaidensis*, *H. aurea*, *H. caerulea*, *H. affinis*, *Hylella bicolor* (15).

The first or south-western group is characterised by (1) the poor representation of the two dominant genera *Limnodynastes* and *Hyla*, or indeed of any genus except *Crinia*, which is not numerically strong in species; (2) by a poverty of peculiar genera (one) and species (two, *C. leai*, and *M. gouldii*); and (3) by the absence of *Chiroleptes*, a characteristic which it shares in common with the south-eastern fauna. Four of the species (including a varietal form) are represented in Tasmania and Victoria; three

(possibly four) in Southern South-Australia, six (?) in New South Wales; three in the Northern Territory; and only one (*H. rubella*) in Central Australia, but with *P. guentheri* (?) as an outlier near the Fraser Range.

The opinion of Sir Joseph Hooker that "South-western Australia is the remnant of the more extensive and more isolated portion of the continent in which the peculiar flora was principally developed" has met with universal acceptance among botanists. Professor Tate in subdividing Australia into botanical subregions, has applied the name Autochthonian to the south-west corner of West Australia, whose internal boundary coincides with the rainfall limit of 25-30 inches per annum.

In his very able Summary of the results of the Horn Expedition to Central Australia, Professor Baldwin Spencer discusses the interesting question of the claim of the botanical Autochthonian province to be considered also a zoological Autochthonian province. From the evidence afforded by the Vertebrata, Professor Spencer arrives at the conclusion that "we find no great [zoological] Autochthonian region occupying the western and south-western part of the continent."

The revised lists of the Batrachia of Tasmania and West Australia now brought forward are certainly a little more satisfactory than those at the disposal of the author of the Summary. But such additional evidence as they afford only goes to strengthen Professor Spencer's position. South-western Australia is now practically isolated except on the north, but there is clear evidence of former relations with Victoria and Tasmania and with the Centre. Its batrachian fauna, as we know it, is a poverty-stricken one, with but little if any marked character of its own, and may well be mainly if not altogether of derivative origin.

The second or north-western group of species seems to have very little (one species *P. guentheri*) in common with the south-western group; but more diligent collecting would probably alter this state of things to a considerable extent. At present all that need be said of it is that the fauna of the north-west stands in sharp contrast to that of the south-west by the presence of no

less than three species of *Chiroleptes*, and by the presence of five other species which also extend to Eastern or Central Australia.

In the fauna of the Northern Territory as known to us, there is only a single endemic species (*C. dahlui*); but the increase in the number of species of *Hyla* is very noticeable. As a whole the fauna is allied on the one hand to that of South-western Australia; and on the other, more closely perhaps to that of Queensland and of New South Wales. As far as present knowledge goes Port Essington appears to be the eastern limit of *Crinia georgiana*, *Heleioporus a/bopunctatus*, and *Hyla adalaidensis*, and the western limit of *Hyla freycineti*, *H. nasuta*, *H. affinis*, and *Hylella bicolor*. But these and cognate matters can be more satisfactorily discussed when the Batrachia of Queensland come under review.

NOTES AND EXHIBITS.

Mr. R. T. Baker exhibited specimens of camphor and camphor oil obtained from the leaves of *Cinnamomum Oliveri*, Bail. The yield of camphor is about $\frac{1}{2}$ per cent. It resembles in odour and appearance the ordinary camphor of commerce. Its melting point was between 173.5 and 175, the melting point of ordinary camphor being given as 175° C. Its specific rotation is also almost identical with that of common camphor. The camphor oil was obtained with the camphor, both floating on the surface of the water, and was separated by pressure. The amount of oil was equal to .364 per cent., but still retained some camphor in solution.

Mr. R. Etheridge, Junr., exhibited some drawings of undetermined leaves, presumably of Tertiary age, from Rollo's Shaft, Coolgardie, forwarded by the Government Geologist of West Australia to Mr. H. Deane. Also specimens of leaves, at present undetermined, from a quarry on the Diamantina River, near Birdsville, a little over the Queensland and S. Australian border, in the former Colony, lat. 25° 55' S., and long. 138° 25' E. approximately. Mr. R. L. Jack states that Birdsville is "a Lower Cretaceous locality, but it is quite possible that there are Desert Sandstone Tablelands in the neighbourhood, and the plants may come from one of these."

Mr. Edgar R. Waite exhibited (1) examples of *Typhlops aluensis*, Blgr., from Wai Obi, Vuna Pi, Fiji, where they are known to the natives as "Naota." This species was previously known only from the Solomon Islands, and the new record supplies further evidence of the similarity of the faunas of the two Archipelagoes. (2) A New Zealand Fish (*Neptotichthys violaceus*, Hutton) recently caught in Port Jackson and the first

recorded occurrence in Australian waters. (3) Two photographs, taken at Layson Island (Hawaiian Islands); one exhibits an immense concourse of Albatrosses (identified by Mr. A. J. North as *Diomedea immutabilis*, Rothschild) incubating their eggs, and the other the method of collecting and transporting the eggs. This photograph shows, in addition to wheelbarrows and boxes, two railway trains, the wagons of which are literally piled up with eggs. (4) A block of limestone from the Jenolan Caves polished by the action of Rock Wallabies (*Petrogale penicillata*, Gray).

Mr. Fred. Turner sent for exhibition a series of specimens of the grass *Danthonia pilosa*, R.Br., from near Finley, Riverina, with the inflorescence affected with a parasitic fungus. Fifteen other species of Australian grasses were known to him as subject to similar attacks, namely:—*Andropogon intermedius*, R.Br.; *Aristida ramosa*, R.Br.; *Chloris truncata*, R.Br.; *Eragrostis leptostachya*, Steud.; *Eriochloa punctata*, Hamilt.; *Hemarthria compressa*, R.Br.; *Hierochloa rariflora*, Hook.; *Ischemum triticeum*, R.Br.; *Leersia hexandra*, Swartz; *Panicum effusum*, R.Br.; *Panicum indicum*, Linn.; *Panicum mitchellii*, Benth.; *Paspalum scrobiculatum*, Linn.; *Sporobolus indicus*, R.Br.; *Sporobolus indicus*, R.Br., var. *elongatus*. The subject of the effects produced upon stock by feeding on diseased grasses was one well worth investigation.

Mr. Palmer showed a specimen illustrating what he thought might be considered an undoubted case of root-grafting. Also a clump of the galls of *Brachyscelis duplex*, Schrader, from the Blue Mountains; and a quartz crystal or sacred stone presented to his father by an aboriginal of the Port Stephens Tribe, fifty years ago.

Mr. North exhibited the sexes of the rare White-vented Wood Swallow, *Artamus albiventris*, which he had shot on Tyreel Station on the Gwydir River on the 9th instant; also the nests and eggs of these birds found at the same time in the top of a

hollow stump by Mr. E. Stirton, of Moree. Also some siliceous stones, land-shells, berries, pieces of coloured glass, and a galvanised iron screw which, in company with Mr. C. McMaster, of "Wilga," Moree, he had procured from a play-house of the Spotted Bowerbird, *Chlamydodera maculata*, on Weebollabolla Station, on the 10th instant. The bower was constructed under the shelter of a "Lemon-wood," *Atalantia glauca*, and had a few stones and freshly gathered berries in the centre of the floor; a small heap of stones, pieces of glass, land-shells and berries at either entrance; a large heap of broken glass, succeeded by another of bones about eighteen inches apart from the entrance on one side, and a similar heap of bones a foot away from the other end. The parallel walls of the bower, which were 18 inches in length, were wholly constructed of dried "spear or corkscrew-grass," *Stipa setacea*, stuck upright in a slight foundation of fine twigs. This confirms a statement made by Mr. McMaster to Dr. Ramsay some years ago that, in the Moree District, *Chlamydodera maculata* uses dried grass instead of fine twigs for the walls of its bower. Also, with the permission of the Curator of the Australian Museum, two sets of eggs of the Pied Honey-eater, *Certhionyx leucomelas*, Cuvier. The eggs vary in ground colour from a dull greyish-white to a very faint cream-white, one set being evenly spotted with rounded blackish-brown markings, and having underlying spots of dull bluish-grey; the other set has a zone of nearly obsolete dull bluish markings towards the larger end, and a few conspicuous spots of dark umber-brown on the outer surface of the shell. Length (A) 0.9×0.61 inch; (B) 0.93×0.62 ; (C) 0.88×0.65 ; (D) 0.86×0.65 . These eggs resemble some varieties of those of the Dusky Wood-swallow, *Artamus sordidus*, and were taken by the late Mr. K. H. Bennett in Western New South Wales, near the South Australian border. At the same time Mr. Bennett obtained the eggs of what he stated shortly before his decease to be an undescribed species of Honey-eater resembling *Certhionyx leucomelas*, which appeared in great numbers one season, and were never observed after. These eggs, of a beautiful greenish-blue ground colour with spots

and blotches of rich red on the larger end, are unlike those of any Honey-eater or other Australian bird. Being forwarded to Dr. Ramsay at the same time with the eggs of *Certhionyx leucomelas*, he inadvertently described them at a meeting of this Society in 1883 as the eggs of the latter species.* The eggs of this presumably new species of bird were also exhibited. Mr. G. A. Keartland, of Melbourne, has lately described the eggs of *Certhionyx leucomelas* in the "Victorian Naturalist" from specimens taken in Central Australia.

* Ramsay, Proc. Linn. Soc. N.S.W. Vol. vii. p. 414.

WEDNESDAY, NOVEMBER 24TH, 1897.

SPECIAL GENERAL MEETING.

Professor J. T. Wilson, M.B., President, in the Chair.

The draft of the Revised Rules submitted by the Council was brought up for the consideration of Members. On the motion of Mr. Henry Deane, the Rules as submitted were unanimously adopted.

MONTHLY MEETING.

The President formally announced the death of Professor T. Jeffery Parker, D.Sc., F.R.S., of Dunedin, a Corresponding Member of the Society, on the 7th instant. It was resolved that an expression of sympathy from the Society should be tendered to Professor Parker's family.

The President commended to the favourable notice of the Members the report of a meeting held at the Town Hall, Melbourne, on the 16th inst., for the purpose of forwarding the movement to establish some permanent memorial of the late Baron von Mueller when it was resolved that it was desirable that steps should be taken to commemorate in some suitable way the late Baron's work; and an influential Committee was appointed to carry out the proposal. It is hoped that a sufficient sum of money will be forthcoming to provide for a bust or medallion of the Baron, as well as for the endowment of a medal or prize to be associated with the Baron's name, and to be awarded from time to time in recognition of botanical, pharmaceutical, or horticultural work in the various Australasian Colonies. Subscriptions

in aid of this laudable project may be sent to Professor Baldwin Spencer, M.A. (The University, Melbourne), one of the Hon. Secretaries.

The President also reminded Members of the forthcoming Meeting of the Australasian Association for the Advancement of Science to be held in Sydney commencing on 6th January, 1898. Programmes were laid on the table for distribution.

A letter from the Permanent Hon. Secretary of the Australasian Association was read, inviting the Society to nominate Members to the General Council. On the motion of Mr. H. Deane, Mr. C. Hedley was nominated as a representative of the Society.

DONATIONS.

Bureau of Agriculture, Perth, W.A.—Journal. Vol. iv. Nos. 22-23 (Oct.-Nov., 1897). *From the Secretary.*

Perak Government Gazette. Vol. x. Nos. 24-27 (Sept.-Oct., 1897). *From the Government Secretary.*

Pharmaceutical Journal of Australasia, Sydney. Vol. x. No. 10 (Oct., 1897). *From the Editor.*

Public Library, Sydney—Annual Report from the Trustees for 1895. *From the Trustees.*

Department of Mines and Agriculture, Sydney—Records of the Geological Survey. Vol. v. Part 3 (1897); Agricultural Gazette of N.S.W. Vol. viii. Part 10 (Oct., 1897). *From the Hon. the Minister for Mines and Agriculture.*

Department of Agriculture, Victoria—Guides to Growers. No. 35. "Rust in Wheat Experiments, 1894-96-97" (July, 1897). *From D. McAlpine, Esq.*

Pamphlet "Les Mines de la Nouvelle Calédonie, &c." Par L. Pelatan (1892). *From C. Hedley, Esq., F.L.S.*

Four Conchological Pamphlets. By E. A. Smith, F.Z.S. *From the Author.*

Victorian Naturalist. Vol. xiv. No. 7 (Nov., 1897). *From the Field Naturalists' Club of Victoria.*

Zoologischer Anzeiger. xx. Band. No. 541 (30th Sept., 1897). *From the Editor.*

Société d'Horticulture du Doubs, Besançon les Bains—Bulletin. Série illustrée No. 21 (Sept., 1897). *From the Society.*

American Museum of Natural History, N.Y.—Bulletin. Vol. ix. Art. xix. (pp. 231-232). *From the Museum.*

New Zealand Institute—Transactions and Proceedings. Vol. xxix. (1896). *From the Institute.*

Journal of Conchology. Vol. viii. No. 13 (Oct. 1897). *From the Conchological Society of Great Britain and Ireland.*

L'Académie Royale Suédoise des Sciences de Stockholm—Bihang. Vol. xxii. (1896-97), Sections 1-4. *From the Academy.*

Société Impériale des Naturalistes de Moscou—Bulletin. Année 1896. No. 4; Année 1897. No. 1. *From the Society.*

Department of Agriculture, Brisbane—Queensland Agricultural Journal. Vol. i. Part 5 (Nov., 1897). *From the Secretary of Agriculture.*

Royal Society of New South Wales—Abstract 3rd Nov., 1897. *From the Society.*

Nederlandsche Entomologische Vereeniging—Tijdschrift voor Entomologie. xl. Deel, 2^{de} Afl. (Sept., 1897). *From the Society.*

Australian Museum, Sydney—Records. Vol. iii. No. 3 (Nov., 1897); Memoir iii. The Atoll of Funafuti. Part 5 (Nov., 1897). *From the Trustees.*

L'Académie Impériale des Sciences de St. Pétersbourg—Annuaire du Musée Zoologique, 1897, No. 2. *From the Academy.*

Société Scientifique du Chili—Actes. Tome vi. (1896), 4^{me}-5^{me} Livs.; Tome vii. (1897), 1^{re} Liv. *From the Society.*

U.S. Department of Agriculture—Yearbook for 1896. *From the Secretary of Agriculture.*

Johns Hopkins University, Baltimore—Hospital Bulletin. Vol. viii. No. 79 (Oct., 1897). *From the University.*

Pamphlet—"Contributions to the Flora of Queensland" (Nov., 1897). By F. M. Bailey, F.L.S. *From the Author.*

Australasian Journal of Pharmacy, Melbourne. Vol. xii. No. 143 (Nov., 1897). *From the Editor.*

PLANTS OF NEW SOUTH WALES, ILLUSTRATED.

PART IX.

BY R. T. BAKER, F.L.S., ASSISTANT CURATOR, TECHNOLOGICAL
MUSEUM, SYDNEY.

(Plates xxii.-xxv.)

ACACIA GLADIIFORMIS, A. Cunn., B. Fl. ii. 365.

(Plate xxii.)

Hab.—George's River, near Campbelltown (J. C. Darley); near Bathurst (W. J. C. Ross); Warrumbungle Ranges (S. Lyndon); Rylstone (R. T. Baker).

The predominating shape of the phyllodia is almost spatulate, and curved as delineated in the figure, the linear lanceolate form mentioned by Bentham being rarely met with, and the glands are more often 3 or 4 than 2 or under.

The rhachis is generally about one-half the length of the phyllodia.

The specimens from the different localities given above show no recognisable variation whatever, those from Coonabarabran being in every respect identical with those from George's River, a difference in latitude of about 300 miles. It is one of the few species of this genus, as far as I am aware, that is without appreciable variation. The phyllodia somewhat resemble the narrower ones of *A. notabilis*, F.v.M., a species which I hope at some future time to show is the desert variety of *A. penninervis*, Sieb.

A. OBTUSATA, Sieb. B. Fl. ii. 366.

(Plate XXIII.)

The following is an amended description :—A tall shrub, quite glabrous, branchlets angular. Phyllodia *exceedingly variable in length and shape, from 1 to 4 inches long, and from 1 to 6 lines broad, narrow-lanceolate or oblanceolate, spathulate*, much narrowed towards the base, straight or *slightly falcate*, very obtuse or *almost acute*, gland *mostly present* below the middle on the upper margin ; 1-nerved, *the nerve closer to the upper than the lower margin*, margins thickened nerve-like, veinlets inconspicuous. Racemes about half as long as the phyllodes, with from six to twelve heads of flowers, mostly 5-merous, under 30 flowers in each head. Calyx turbinate, sepals thick, *obtuse*, spathulate, ciliate, half or $\frac{2}{3}$ as long as the corolla, at first united but readily separating when fully out. Petals glabrous, *often ribbed*. Pistil glabrous. *Pod flat, almost always straight, with only the slightest tendency to curve, glabrous, margins thickened and parallel, 3 to 4 inches long and 5 lines broad, impress of the seed prominent on the outside. Seed oblong, longitudinal, funicle filiform to the one small fold and then thickened into a small boat-shaped axil under the seed.*

Hab.—Blue Mountains ; Barber's Creek (H. Rumsay) ; and southern coast range to Victoria.

This species was described early in this century from flowering specimens only, and as in the case of many other Acacias, the pods and seeds have only been collected within the last few years. As will be seen above and in the plate, the essential parts hitherto wanting in this particular species are here recorded for the first time ; and in addition there is figured a series showing the extreme variability of the phyllodes and also other important parts necessary for comparison with its congeners.

It will also be noted that the descriptions here given of some of the parts differ from those of previous authors, but the differences, although important, and the result of an examination of a large number of specimens, are yet in themselves, I think, not sufficient to justify the recognition of any new varieties.

The number of flowers in the head was always below 30 in the material examined, although Bentham gives the number above 30.

The gland is also hardly ever wanting.

A. RUBIDA, A. Cunn. B. Fl. ii. 366.

(Plate XXIV.)

Bentham's description in the Flora may be supplemented as follows:—

Sepals smooth or with a few scattered hairs, half as long as the petals, usually coherent. Petals smooth or with a few scattered hairs, sometimes slightly ribbed.

Pod 4 to 5 inches long and 4 lines broad, slightly curved or straight, valves thinly coriaceous.

Seeds longitudinal, oblong; funicle slightly or not at all enlarged under the seed, encircling it in a double fold, and occupying the space between the seed and the margins of the valves.

Hab.—Thornleigh, near Sydney (W. W. Froggatt); Blue Mountains (Sieber); Hill Top, Southern Line (J. H. Maiden); Queanbeyan (Forester Harris).

The fruits of this species are now recorded for the first time. This species is very rarely found in fruit, and plants of it have been under observation for years without finding any traces of a pod. I experienced great difficulty in finding satisfactory pistils in the numerous flowers examined under the microscope, so perhaps they may often be abortive—hence the absence of fruit.

Bentham, in his description of this species (B. Fl. ii. 366), states that it is “allied to *A. amoena* and perhaps a variety.”

As the pod was unknown to him, he probably based the remark on a resemblance of the flowers and phyllodia of the two species to each other, but if his account of the funicle of *A. amoena* is correct, then the two are distinct species, for the funicle in this case does not surround the seed in a triple fold.

It is very noticeable how the phyllodia and branchlets turn a bright red colour when pressed.

A. TRIPTERA, Benth. B. Fl. ii. 323, var. LYNDONI, R.T.B.

(Plate xxv.)

A tall, dense shrub with long pendent branches, glabrous. Phyllodia numerous, decurrent on the stem, rigid, inclined to erect or running out obliquely from the stem, not recurved as in the type, almost triangular in shape; the upper edge curving upwards to the pungent point, sometimes obliquely lanceolate when in fruit, 1 to 2 inches long, about 6 lines broad, striate with several prominent nerves, without any marginal gland. Peduncles solitary or 2 together, mostly at the ends of the branches, each bearing a cylindrical spike of $\frac{3}{4}$ inch. Flowers not crowded, fairly large, 4-merous. Calyx smooth, short, broadly lobed. Petals smooth, separating when fully in flower. Pod curved, 3 to 4 inches long, 2 lines broad, valves coriaceous, contracted between the seeds. Seeds longitudinal, funicle folded 3 or 4 times upon itself, slightly thickened under the seed.

Hab.—Round Mountain, Coonabarabran (S. Lyndon).

This variety is very distinct from the type as described by Bentham and figured by Baron von Mueller (Ic. Au. Ac. ix.) The phyllodia have quite a characteristic shape, there being an absence of the recurved-falcate form mentioned by Bentham. They are also broader and thicker, and the flowers are larger than specimens from the interior. When placed for comparison in juxtaposition with the type, its characters stand out as very marked, but still there is no distinctive feature either in the pod or flower, sufficient to warrant its being raised to specific rank.

A complete set of specimens was collected by the late Mr. S. Lyndon, B.A.

EXPLANATION OF PLATES.

Plate xxii.

A. gladiiformis, A. Cunn.

Fig. 1.—Flowering twig.

Fig. 2.—Flower (enlarged).

Fig. 3.—Pistil ,,

Fig. 4.—Pod.

Fig. 5.—Seed showing funicle (enlarged).

Plate XXIII.

A. obtusata, Sieb.

- Fig. 1.—Typical flowering twig.
Fig. 2.—Flowering twig of variety with small phyllodes.
Figs. 3, 4, 5.—Phyllodia.
Fig. 6.—Bud (enlarged).
Fig. 7.—Expanded flower (enlarged).
Fig. 8.—Pistil (enlarged).
Fig. 9.—Pod.
Fig. 10.—Portion of valve showing seed *in situ*.

Plate XXIV.

A. rubida, A. Cunn.

- Fig. 1.—Flowering twig.
Fig. 2.—Bud (enlarged).
Fig. 3.—Expanded flower (enlarged).
Fig. 4.—Pistil (enlarged).
Fig. 5.—Pod ,,
Fig. 6.—Seed ,,

Plate XXV.

A. triptera, Benth. var. *Lyndoni*, R.T.B.

- Fig. 1.—Flowering twig.
Fig. 2.—Expanded flower (enlarged).
Fig. 3.—Pistil.
Fig. 4.—Pod and phyllode (nat. size.)
Fig. 5.—Seed.

NEW SOUTH WALES FUNGI.

BY D. McALPINE.

(Communicated by R. T. Baker, F.L.S.)

(Plates XXVI.-XXVIII.)

The following seven fungi sent by Mr. R. T. Baker, of the Technological Museum, occur on the leaves or bark of indigenous plants. Four of them are new to science, two are new to the colony, and one has been previously recorded from a different locality.

FUSARIUM BYSSINUM, n.sp.—Byssoid *Fusarium*.

(Plate XXVI., figs. 1-2.)

Hypophyllous. Pustules pulvinate, gregarious, here and there confluent, firm, byssoid at base, at first flesh-colour finally bright orange-yellow, often with small cup-shaped depressions on top, generally circular and 2-3 mm. in dia. Hyphæ hyaline, densely compacted, slender, about $1-1\frac{1}{2}\mu$ thick. Conidia hyaline, fusiform, straight, pointed at both ends, continuous, rarely one-septate, $11-14 \times 1\frac{1}{2}-2\mu$.

On leaves of *Desmodium* sp. July. Murwillumbah, N.S.W. (Baker, 2).

This is a very striking form, from its size and bright appearance. *Ramularia Desmodii*, Cke., (*Fusisporium pubescens*, B. & C.), and *Cercospora Desmodii*, Ell. & Kell., occur on the leaves of this genus, but are quite distinct. There is an orange *Fusarium* (*F. hypochreoides*, Cke. & Mass.) on fading leaves of *Ficus* in Queensland, but the pustules are much smaller and the conidia stouter. In *F. aurantiacum*, Sacc., the gonidia are straight and not pointed at the ends.

MELIOLA AMPHITRICHA, Fries.—Amphitrichous Meliola.

Sporidia up to $50 \times 19 \mu$.

On leaves of *Dysoxylon* sp.; commonly on under surface, slightly on upper. July. Murwillumbah, N.S.W. (Baker, 3).

Already described on *Dysoxylon rufum*, Benth., from Richmond River in P.L.S.N.S.W. (2) x. 1895.

ASTERIDIUM EUCALYPTI, Cooke & Mass.—Eucalyptus Asteridium.

(Plate xxvi., figs. 3-4.)

Spot-like, radiating, superficial, black, minute patches, gregarious, often confluent, on upper and under surfaces of leaf. *Hyphæ* dark brown, thick-walled, much branched, septate, average $9-10 \mu$ broad, with numerous short, stout, ultimate branchlets usually uniseptate. *Perithecia* minute, hemispherical or discoid, flattened, black, but dark brown under microscope, composed of radiating, transversely septate filaments, margin scalloped, $80-94 \mu$ broad by $84-88 \mu$ deep. *Asci* pyriform, 4-spored. *Sporidia* elongated, ellipsoid, triseptate, constricted, brown, one segment enlarged, $26 \times 11 \mu$.

On leaves of Red Apple (?*Memecylon* sp.). July. Murwillumbah, N.S.W. (Baker, 4).

Only found hitherto in Victoria on dead leaves of *Eucalyptus amygdalina*, and described in Grev. xvi. 1888, p. 74.

ASTERINA TUBERCULATA, n.sp.—Tuberculate Asterina.

(Plate xxvi., figs. 5-8.)

Hypophyllous, causing the shining leaves to become entirely or partially dirty yellow on the affected side. Spots suborbicular, black, gregarious, often contiguous, with radiating, somewhat superficial mycelium and minute, black, gregarious, punctiform perithecia. *Hyphæ* next to matrix colourless to greyish, septate, branched, creeping on or immediately beneath epidermis, $4-5\frac{1}{2} \mu$ broad. Dark brown *hyphæ* thick-walled, septate, branched, with numerous, undivided tubercles representing ultimate branch-

lets, $5\frac{1}{2}$ - $7\frac{1}{2}\mu$ broad. *Perithecia* membranaceous, generally orbicular, sometimes elongated-oval ($260 \times 140 \mu$), flattened, composed of radiating transversely divided filaments, with adherent fibrils, brown, variable in size, 56 - 188μ in diameter. *Asci* ovate, 8-spored, 56 - 84×41 - 52μ . *Sporidia* dark brown, elliptic, uniseptate, slightly constricted, 33 - 37×17 - 19μ .

On leaves of *Geitonoplesium cymosum*, Cunn. July. Murwillumbah, N.S.W. (Baker, 5).

The sporidia are at first colourless, then olive-green, and finally of a very dark brown colour. When the asci are treated with potassium-iodide iodine the sporidia, as well as the contents of the inner wall, are a beautiful chestnut-brown, and outside of that a pale green colour.

MELIOLA DENTICULATA, n.sp.—Dentate Meliola.

(Plate xxvi., figs. 9-13.)

Epiphyllous. Minute, black, superficial, scattered, velvety spots. *Hyphæ* next to matrix, creeping, colourless, septate, branched, forming a gelatinous network attaching the fungus to its host, very slender and gradually thickening as they merge into the brown filaments, 2 - 4μ broad. Brown *hyphæ* thick-walled, and sometimes rough, septate, much branched, branches often opposite, $7\frac{1}{2} \mu$ broad, ultimate branchlets numerous, short, stout, 1-2 septate. Appendages simple, dark chestnut, thick-walled, rigid, erect, septate, rounded at apex or usually variously toothed, up to 11μ broad. *Perithecia* dark brown, globose, depressed, irregular at margin with a few adherent fibrils, 70 - 84μ diameter. *Asci* not observed. *Sporidia* yellowish-brown, rather fusiform, triseptate, slightly constricted, $19 \times 4 \mu$.

On leaves of *Dysoxylon* sp. July. Byaneum, N.S.W. (Baker, 6).

In *Meliola bidentata*, Cke., the appendages are bidentate at the tips, but here they are more numerous and usually forming a whorl. As this is a very characteristic feature, it is embodied in the specific name.

MELIOLA CLADOTRICHA, Lev.—Branch-haired Meliola.

(Plate XXVIII., figs. 21-23.)

Hypophyllous. Spots roughly orbicular, black with brownish tinge, velvety, 4-6 mm. diameter, often confluent. *Mycelium* of dark brown, thick-walled, septate filaments, branching antler-like, ultimate branches tapering and more transparent, up to $9\ \mu$ broad. *Perithecia* in groups at the centre of the spots, black, globose, fully $\frac{1}{3}$ mm. in diameter, and covered with numerous, rigid, usually curved or flexuous, simple, septate, brown appendages. *Asci* oblong or elongated-elliptical, 4-8 spored, sessile, $66-112 \times 26-37\ \mu$. *Sporidia* at first colourless, then yellowish-green, finally brown, elongated-ellipsoid, triseptate, $43-47 \times 17\ \mu$.

On leaves of *Eugenia* sp. August. Richmond River, N.S.W. (Baker, 8).

The colourless sporidia are stained canary-yellow with potassium-iodide iodine, and both coloured and colourless may be together in the same ascus. The mycelium radiates at the circumference of the spot in the form of distinct, seal-brown, branching filaments, and the denser darker centre bears the globose perithecia in groups.

BOTRYTIS ARGILLACEA, Cooke, var. AVICENNIAE, McAlp.—**Clay-coloured Botrytis.**

(Plates XXVII, figs. 14-17; XXVIII., figs. 18-20.)

Gregarious, firm, orbicular, tubercular, sometimes confluent; clayey-brown, rather large but variable in size; from 2 mm. to 1 cm. in diameter. *Conidiophores* densely compacted, collectively dark brown, individually almost hyaline, straight, septate, repeatedly laterally branched, and towards apex usually branched in a tri-radiate manner, contents finely granular, about $4\frac{1}{2}\ \mu$ broad. *Conidia* produced terminally, pale yellowish to colourless, continuous, elongated-oval to ovate, $9\frac{1}{2}-11 \times 4-5\frac{1}{2}\ \mu$. Young tubercles are of firm consistency and black in section, but magnified the sections show light and dark coloured layers; old tubercles

crack, and the contents partially or almost entirely break up into black, firm, variously sized and shaped sclerotoid bodies which are squeezed out. The sclerotoid bodies are usually elongated with irregular outlines, and when crushed are seen to consist of a dense mass of brown or yellowish-brown septate, intertwisted hyphæ, averaging $5\frac{1}{2}\mu$ in thickness, but varying from $4-7\frac{1}{2}\mu$.

On bark of *Avicennia officinalis*, L. February. Ballina. (Baker, 7).

The conidiophores were recognised as resembling *Botrytis argillacea*, Cooke, figured in Grev. iii. Pl. 48, fig. 6, but the tubercles were rather puzzling. However, on sending a specimen to Professor Saccardo, he kindly replied as follows:—"I have examined your fungus on the bark of *Avicennia*. The stroma is formed by a *Hypoxylon*, perhaps allied to *H. purpureum*, of which the conidial stage is the argillaceous Mucedine. Already Alberti and Schweinitz had a knowledge of this Hyphomycete (*Dematium virescens*). Your species approaches *Botrytis argillacea*, Cooke, only the principal hyphæ of your species seem to be shorter. It would be necessary to know the species of *Hypoxylon* borne by *Avicennia*, but on the whole it might be made provisionally a variety of *Botrytis argillacea*." Accordingly I have given it the varietal name of *Avicenniae*.

EXPLANATION OF PLATES.

Plate xxvi.

Fusarium byssinum.

Fig. 1.—Under surface of large leaflet with bright orange-yellow pustules (nat. size).

Fig. 2.—Conidia ($\times 1000$).

Asteridium eucalypti.

Fig. 3.—Portion of hypha with stout, uniseptate, ultimate branchlets ($\times 540$).

Fig. 4.—Immature and mature sporidia, the latter with the characteristic swollen segment.

Asterina tuberculata.

- Fig. 5.—Under surface of leaf with black stain-like markings (nat. size).
Fig. 6.—Hypha showing tubercular branchlets ($\times 540$).
Fig. 7.—Asci and two separate olive-green sporidia ($\times 540$).
Fig. 8.—Mature sporidium, very dark brown ($\times 1000$).

Plate XXVII.

Meliola denticulata.

- Fig. 9.—Colourless hyphæ passing into coloured with thickened wall ($\times 1000$).
Fig. 10.—Apex of appendages, toothed and smooth ($\times 1000$).
Fig. 11.—Surface view of perithecium ($\times 540$).
Fig. 12.—Young perithecium originating as a branch from hypha, in optical longitudinal section ($\times 1000$).
Fig. 13.—Sporidia ($\times 1000$).

Botrytis argillacea var. *avicenniae*.

- Fig. 14.—Fungus on bark (nat. size).
Fig. 15.—Section of tubercle (nat. size). It looks black in section, and may be solid throughout or partially broken up into sclerotoid bodies.
Fig. 16.—Section of small tubercle (nat. size and magnified). There is a central core of fine (whitish) fibres, an outer and inner layer of dark, dense, almost black fibres, and the rest is of a yellowish-brown.
Fig. 17.—Branching conidiophores ($\times 540$).

Plate XXVIII.

Botrytis argillacea var. *avicenniae*.

- Fig. 18.—Tri-radiate branching towards apex and apical conidium ($\times 1000$).
Fig. 19.—Detached conidia ($\times 1000$).
Fig. 20.—Sclerotoid bodies ($\times 52$).

Meliola cladotricha.

- Fig. 21.—Antler-like branching hypha, also septate, but the septa are concealed by the dark colour ($\times 270$).
Fig. 22.—Asci 4- and 8-spored ($\times 145$).
Fig. 23.—Sporidium ($\times 1000$).

OBSERVATIONS ON THE EUCALYPTS OF NEW SOUTH WALES.

PART III.

BY HENRY DEANE, M.A., F.L.S., AND J. H. MAIDEN, F.L.S.

(Plates XXIX.-XXXIII.)

EUCALYPTUS HÆMASTOMA, Sm.

Introductory.—The species is found in two principal varieties,—a coarse form (the type), and a slender one, the latter with small flowers and fruits, and known as variety *micrantha* in consequence.

As regards the type, the leaves, flowers and fruits are alike larger, and the leaves thicker, but, as a rule, the tree itself does not attain the magnitude of its variety.

With Bentham's amplified description of the species as given in B. Fl. iii. 212, we in the main agree, so that it will only be necessary to add a few notes.

Vernacular names.—"White Gum" is the commonest and most appropriate name for this species. As regards the vernacular names in the *Flora Australiensis*, Cunningham's name of "Blackbutt" is a misnomer and has probably arisen from confusion of this species with the "Mountain Ash" (*E. Sieberiana*), and the name of "Mountain Ash" for *E. hæmastoma* has probably arisen through too close reliance upon herbarium specimens, those of *E. hæmastoma* and *E. Sieberiana* being frequently difficult to discriminate unless complete material be available. The resemblances of the two species will be again referred to when *E. Sieberiana* is dealt with.

Bark.—Smooth, with a few ribbony flakes near the butt.

The species referred to in the following paragraph in the *Eucalyptographia* is most probably our *E. fastigiata* (*Proc. Linn. Soc. N.S.W.*), and we may mention that we have never seen true *E. hæmastoma* other than a white or at the most a ribbony gum.

"*E. hæmastoma* occurs, however, also occasionally with bark persisting up to the last branches, according to Mr. Wilkinson, and would then come under the category of the Stringybarks; in such a state for instance it is known from the Dromedary Range up to 1,500 feet above the sea-level in the Silurian formation." (N.B.—We have found it up to 3,000 feet on Tantawanglo Mountain.)

Timber.—Red, and of an inferior character, though a fairly lasting timber for posts in the districts in which it grows.

Sucker leaves.—Broadly lanceolate, somewhat similar in shape to the adult leaves, only larger; 4 to 6 inches long by $1\frac{1}{4}$ inches broad, are measurements of some from the Sydney district.

Mature leaves.—Coriaceous, thick, spreading, and veins very distinct, oblique, and several starting from near the base of the leaf. As in the case of some other species, the mature foliage of trees growing close to the sea is very coarse and thick.

Peduncles.—Angular and flattened.

Calyx-tube.—Much longer than the operculum and insensibly tapering into the pedicel.

Operculum.—Pointed when young, becoming more hemispherical as maturity is approached. Often the buds may be described as clavate.

Fruits.—Not so flat-topped as *micrantha*. *Rim never depressed*.

Speaking generally the shape of the fruits reminds one of a pear. The rim is more or less domed and usually brownish or red (hence the specific name). We do not agree that, speaking at all generally, "the capsule is slightly depressed," as stated at B.Fl. iii. 212.

Pedicels not so thin, being more tapering than is the case with var. *micrantha*.

Sometimes the fruits are hardly pear-shaped, but this is unusual. We have some nearly hemispherical, but much larger than those of var. *micrantha*. At the same time there are fruits which undoubtedly show transition between *E. hæmastoma* and its variety *micrantha*.

In some cases trees belonging to this species have fruits in dense heads. In these trees the foliage is coarser and larger than that of var. *micrantha* usually is; at the same time the fruits, while numerous in the head, have thicker pedicels than those of var. *micrantha*; as regards size, the fruits are intermediate between the type and its variety. These clustered fruited forms occur on the Blue Mountains and on the Hawkesbury Ranges.

Range.—The typical species apparently does not extend much beyond the Hawkesbury sandstone, and is most abundant not far from Port Jackson, the Hawkesbury and George's River, and the ridges and broken country in the vicinity. While the range is not very precisely defined at present, that of the variety *micrantha* is undoubtedly very much more extensive.

Affinities.—Chiefly with *E. Sieberiana*, the only species (now that *E. virgata* has been abolished as a specific name) with which it could readily be confused.

E. HÆMASTOMA var. MICRANTHA.

Introductory.—In many respects resembling *E. hæmastoma*, but the flowers are much smaller and the tree is never rough on the lowest part of the trunk, but always smooth, right to the ground.

It is one of the most uniform of our Eucalypts, whether occurring on the coast sandy flats, or on the mountain ranges.

Vernacular names.—"White Gum" is a very common name. It, however, in one or other of the many districts in which it occurs, usually goes under some name referring to the softness or brittleness of its timber, e.g., "Cabbage Gum," "Snappy Gum," "Brittle Gum," "Brittle Jack."

Bark.—Smooth, right to the ground. The colour of the bark is usually white, but sometimes, particularly in localities comparatively remote from the sea, the bark is at certain seasons of the year yellowish. Away from the sea, also, the bark appears to have a greater tendency to peel off in patches, giving it more or less a spotted appearance.

Timber.—Soft, red. An excellent timber for fencing posts, and in some districts, especially the southern table land, preferred for this purpose.

Sucker leaves (very young).—Nearly ovate, then nearly oblong (rounded at both ends) and with crenulate margins. As growth proceeds, they become attenuate at both ends and somewhat falcate.

Young foliage.—Blue-green, a little glaucous, and with purple-brown twigs. Alternate, ovate-lanceolate, very acuminate, a little oblique, up to 6 inches long and $2\frac{1}{2}$ broad. The intramarginal vein much removed from the edge. From this stage the foliage gradually develops into the mature stage.

Mature leaves.—These vary somewhat, which is not a matter for surprise, considering the extensive range of the tree. They are often thick and glossy. Those from Bargo Brush are of this character, and $5\frac{1}{2}$ inches long and 1 to $1\frac{1}{2}$ broad. Those from Queanbeyan are narrow-lanceolate. Some in the Sydney district are quite small, usually not exceeding 3 by $\frac{1}{2}$ inch. The foliage of many trees in the Mudgee district is quite sparse. In the Macleay and Hastings districts the trees frequently have broadish, lanceolate long leaves up to 7 inches by $1\frac{1}{2}$. Sometimes the leaves are hooked at the ends, a character more general in Eucalypts than was at one time supposed.

But there is no doubt that the leaves of this form pass insensibly into those of the normal species. Specimens from the Blue Mountains (e.g., Mt. Victoria) of var. *micrantha* show this transition very clearly.

Peduncles.—Some specimens show a radiate inflorescence and a very large number of flowers and yellow buds (e.g., at Grenfell).

Operculum.—Nearly hemispherical or with a small umbo; less pointed than in the typical form.

Fruits.—The fruits are usually as flat-topped (they are but rarely slightly domed) as in any species of Eucalyptus, and therefore are not satisfactorily represented in the figure of *E. haemastoma* in the *Eucalyptographia*. The fruits are small, nearly hemi-

spherical, rarely tapered below, have thin pedicels, and are usually numerous. Some from Queanbeyan are $\frac{5}{32}$ of an inch in diameter. Those from Grenfell, Bargo, &c., have flat tops and sharp rims. Some from the Mudgee district and south coast afford instances of slight doming of the fruits. Occasionally they are depressed hemispherical,—almost tazza-shaped. They are often pale coloured and with markedly red mouths.

We have fruits from Mt. Wilson which, though quite small, taper like those of normal *hamastoma*, and are in some respects connecting links.

Range.—This is much the most widely distributed form of the species. Besides New South Wales it is also found in Queensland, and in our own colony it extends from north to south, and from the coast across the tableland to at least as far west as Tumut, Bumberry and Mudgee.

Size.—Usually 30 or 40 feet in height, with a trunk diameter of 2 or 3 feet.

E. STRICTA, Sieb.

The original description of *E. stricta* (Sieb. *Curr. post.* 195) is as follows:—*E. operculo submutico pedunculis lateralibus 2-floris foliis linearibus acutis coriaceis glabris subpunctatis.*

Bentham (*Flora Australiensis*) places the species in the *Porantheræ*, and gives the following notes concerning it:—

“Umbels several-flowered, often solitary in the axils, the upper ones in terminal corymbose panicles. Operculum usually conical, about as long as the calyx tube. Pedicels short. Leaves linear, thick, the oblique veins seldom visible. Umbels all axillary.”

He also places it in his allied series *Micrantheræ*, but as pointed out by Mueller (*Eucalyptographia*), in making this classification, he probably only had very young flowers for dissection.

E. stricta is usually considered to be the mountain form of a species, of which *E. obtusiflora* is the coast form.

In the *Eucalyptographia*, it is worthy of note that under *E. stricta* Mueller includes *E. virgata* and *E. Luehmanniana*, but not *E. obtusiflora*.

General remarks.—The name *stricta* is rather a happy one, though not exclusively characteristic. It is a shrubby species, with a number of thin stems of approximately equal diameter. It has been compared in habit to a Mallee, but it has no thickened root-stock. Height from 6 to 15 feet.

Bark.—Falling off in strips, leaving smooth stems.

Timber.—Pale coloured, but too small to furnish what is commercially known as timber.

Mature leaves.—Rigid, very coriaceous, varying from narrow-linear to ovate-lanceolate. Usually hooked at the apex. Often glossy.

It will be convenient to group the species with respect to the shape of the leaves. They, however, appear to run into each other by insensible gradations.

a. Coriaceous, lanceolate leaves, more or less falcate, almost acuminate. Average length $3\frac{1}{2}$ to 4 inches, and breadth $\frac{5}{8}$ inch.

Hub.—South Coast, *e.g.*, Sugar Loaf Mountain (Braidwood), Moruya and Candelo; also Blue Mountains.

Apparently large when growing in congenial situations, but leaves and fruits smaller when growing in bleak, sterile localities.

b. Coriaceous, linear-lanceolate, hooked leaves.

Hub.—Blue Mountains generally.

De Candolle, followed by Bentham, gives the leaves as linear-lanceolate or linear, but it is quite impossible to exclude broader leaved forms.

Peduncles.—Flattened or angular. Each with 4 to 8 (Bentham) or 5 or 6 (De Candolle) shortly pedicellate small flowers.

Calyx tube.—Not 2 lines in diameter, tapering.

Operculum very short, nearly hemispherical, surmounted by a point (umbonate). Much shorter than the calyx tube. Bentham speaks of the buds as ovoid. This is hardly true as a general rule. They are clavate, and often yellowish, especially the operculum. Bentham notes that the operculum is not longer than the calyx tube. It is usually very much shorter. It may be remarked that in regard to the general shape of the operculum, with its umbo, this species bears resemblance to *E. obtusiflora*.

Anthers.—The stamens are folded in the bud and the anthers are all fertile and renantherous.

Fruits.—Globose-truncate, smooth, often glossy, up to 5 lines broad and 6 deep, but varying in size, contracted at the orifice, i.e., slightly urceolate, the rim narrow or thin, the capsule sunk, and the valves not protruding. Usually the valves are very much sunk, but occasionally (e.g., at Wentworth Falls) the tips of the valves are flush with the top of the capsule.

Apparently the capsule is always sunk in Blue Mountain specimens, the edge of the capsule (rim) being thin and gradually sloping into the orifice.

A connecting link with the series of specimens (*obtusiflora*, &c., with a horizontal rim) is furnished by specimens from Sugar Loaf Mountain, Braidwood, where on the same plant are fruits of typical *stricta* with thin, sunk rim, and those with a broadish, scarcely sunk, horizontal rim.

The affinities in fruit are to some forms of *E. obliqua*, but the rim of the latter is thicker (see *Eucalyptographia*). The closest affinity is, however, with *E. obtusiflora*, as pointed out at page 715.

Range.—The Blue Mountains and the Braidwood and Moruya districts. The intermediate localities are not defined with certainty. It cannot be stated that the true *E. stricta* is found in the Port Jackson district, as recorded by Bentham.

E. STRICTA var. *RIGIDA*.

General remarks.—Forms a scrubby growth.

This plant is undoubtedly a small form of *E. stricta*, but as it is uniform in appearance it would be desirable to name it as a variety as a matter of convenience. Sieber's MS. name of *rigida*, under which it appears to have been distributed in the first instance, may be adopted.

Vernacular names.—Called "Boree" at Berrima, though the use of the name (usually given to an *Acacia*) should not be encouraged.

Seedling leaves.—Not seen.

Mature leaves.—Very coriaceous, narrow-linear. Not exceeding $\frac{1}{4}$ inch in breadth, though 4 inches long. Neither the marginal nor transverse vein visible, or scarcely so. They strongly resemble those of *E. stellulata*, var. *angustifolia* (*E. microphylla*, A. Cunn.), but the two plants can be readily separated by means of their fruits.

Buds.—These often show a double operculum, in common with very many species of the genus. It may be that this double operculum will be eventually found to occur in all Eucalypts; we have observed it in a large number of species.

Fruits.—Much smaller than those of the typical form, slightly urceolate, much resembling those of *E. piperita*.

Range.—Berrima, Blackheath.

E. LUEHMANNIANA, F.v.M.

This small tree was originally described by Mueller (*Fragm.* xi. 38) as *E. Luehmanniana*. The species was suppressed by the author in his *Census* (1st Edition, 1882), but not before he had included it under *E. stricta* (*Eucalyptographia*). In the 2nd Edition (1889) of the *Census* it appears (by reference) under *E. virgata*, Sieb., which species itself had been suppressed in the 1st Edition of the work. Baron von Mueller was, as a rule, averse to naming varieties however well marked. There is little doubt that, had he again named it, it would have been under the style *E. virgata*, var. *Luehmanniana*. The late Rev. Dr. Woolls used to regard it as a variety of *hæmastoma*, and used to name it *grandiflora*, stating, in a letter, "many Eucalypts, e.g., *punctata*, *resinifera*, have a *grandiflora* form, and so has *hæmastoma*." Although for the last few years of his life he consistently held this view, we cannot find that he put it in print.

We are of opinion that it would be a matter of convenience to revive Mueller's species of *Luehmanniana*. It bears affinity to at least two species, but we are of opinion that the course we propose is less free from objection than to consider it a variety of either. Although *E. Luehmanniana* eventually passes into *E.*

obtusiflora, the form with which it possesses closest affinity, we would point out that each case of nomenclature must be considered on its merits, and that many Eucalypts, whose specific value is not at present disputed, possess a large series of varieties which insensibly pass into those of other species.

Mueller (*Fragm.* xi. 38) has already described the tree pretty fully; there is no necessity for us to repeat this, and we content ourselves by emphasising certain points, some of which have not been touched upon in the original description.

General remarks.—This species is glaucous, even nearly white. At the same time it imperceptibly passes into non-glaucous forms. The branchlets are angular, and the species is coarse.—peduncles, fruits, leaves, &c., being alike large. These three points are the most obvious indications of the species.

Bark and timber.—Apparently the same as *E. stricta* and *obtusiflora*.

Seedling leaves.—Coarse, up to 7 inches long by 4 inches wide. The resemblance to those of *E. hæmastoma* is striking.

Mature leaves—Distinctly falcate, up to 8 inches by $1\frac{1}{2}$ inches. Coriaceous; edges thickened; marginal vein usually at a little distance from the edge.

Peduncles—Very much flattened. We have specimens which spread out upwards, so much that they are $\frac{1}{2}$ inch wide at the place of attachment of the inflorescence. Top of peduncle quite broad and fleshy in which the pedicels are articulate.

Buds.—Angular, pointed.

Calyx-tube.—The calyx often tapers into a widely expanded lobe, which is articulate on a broad-topped common peduncle; usually 7 flowers in a head.

Operculum.—Double operculum or large calyptra-like bracts enveloping the whole head of flower-buds, and only thrown off when the individual flower-buds are nearly ready to throw off their own opercula.

Stamens.—Nearly all fertile.

Fruits.—Often pale brownish and glossy, 5-celled, corrugated—partly due to drying; the rim slightly projecting.

Specimens from the north of Port Jackson (between this estuary and the Hawkesbury River) appear to differ from the type only in the following particulars:—

1. They are glabrous.
2. The calyx-tube is more elongated and the stalk of the fruit thinner.

The most obvious difference is the almost entire absence of glaucousness; no other difference is obvious or constant.

Plants from the Spit (Middle Harbour, Sydney) have the buds quite pointed, and long, with non-glaucous leaves. This is a form which would be separated from *E. obtusiflora*, with greater or less reluctance, according to the elasticity of view held in regard to the definition of *E. obtusiflora*.

Range.—Near Bulli (F.v.M.), thence as far north as Middle Harbour, Port Jackson, but the precise northerly range not yet defined.

Following are notes upon a mountain variety of the preceding species:—

E. LUEHMANNIANA var. *ALTIOR*, nobis.

We have observed at Mt. Wilson (the precise range we do not know) a tree which may be described as a form of *E. Luehmanniana*, with fruits and all other parts comparatively small. The following notes will render the resemblances and differences clear:—

Immature foliage, inflorescence and fruits, also twigs, all glaucous.

General remarks.—A tree of 60 or 70 feet with a trunk diameter up to 2 feet. It will be observed that the tree is far larger than that of *E. Luehmanniana*, a circumstance which we record in the name *altior*.

Bark.—Smooth, with some bark near the butt, falling off in ribbons. A "White Gum."

Timber.—Pale coloured.

Seedling leaves.—Not seen.

Mature leaves.—Very similar to those of *E. Luehmanniana*, with perhaps the following differences :—

The leaves are thinner, the petioles less flat, and there is a greater tendency in the lower leaves for the veins to proceed right from the base of the leaf. Rarely longer than $4\frac{1}{2}$ inches or broader than 1 inch.

Peduncles.—Very much flattened, in proportion to the size of the fruits, perhaps as much so as is the case in the preceding form.

Calyx tube.—Similar to the preceding, though less angular. Usually 7 flowers in a head.

Operculum.—Proportionately smaller, also less pointed. Pale coloured operculum like some of the slightly pointed-operculum coast-forms of *obtusiflora*.

Fruits.—Flat-topped; when not fully ripe quite glaucous, with the exception of the rim which is red, contrasting strongly with the remainder of the fruit, which is smoother than the preceding. Pale brown and shining when fully ripe; from nearly hemispherical to subconical, the edge of the rim sharp, and 5-celled.

Dimensions.—Greatest length and greatest breadth of fruit about $\frac{7}{16}$ inch. Width of rim in mature fruit $\frac{1}{8}$ inch.

Range.—In the taluses of the sandstone cliffs about Mt. Wilson.

E. OBTUSIFLORA, DC.

General remarks.—*E. obtusiflora* is recognised as a species in the *Flora Australiensis*; it is ignored as a species, and only very incidentally alluded to (under *E. stricta*) in the *Eucalyptographia*.

We think that *E. obtusiflora* should be retained as a species. At the same time we have a series of specimens absolutely connecting it with *E. Luehmanniana*. It, however, differs from that species in several important particulars :—

(1) Size and curvature of leaves. Those of *E. obtusiflora* are small, broad in comparison with their length, shiny, thick, usually blunt, and with strongly marked veins.

(2) Shape of fruits—being more subcylindrical than those of *E. Luehmanniana*.

(3) In the peduncles and shape of the buds.

Following are notes on three trees from the Spit, Middle Harbour, Port Jackson.

(a) 15 feet high. Angular twigs, pale-coloured foliage, the leaves falcate and hooked, 2 to $3\frac{1}{2}$ inches, or rarely 4 inches long. Pointed yellowish operculum. Fruits 5-celled, over $\frac{1}{2}$ inch long by about $\frac{5}{18}$ across, and pale-coloured. They have a long, broad common peduncle, and the calyx is elongated and continuous with the pedicel.

(γ) Operculum (as figured) pointed. Fruits 5-celled, flat-topped or a little domed (as figured) and barely half an inch long. The common peduncle elongated, and much flattened upward.

(δ) Operculum pointed. Fruits half an inch long, flat-topped, but sunk, angled, in addition to a certain amount of longitudinal folding, the result of shrivelling, common to both *E. obtusiflora* and *Luehmanniana*. Leaves very shiny, thick, and with strongly marked venation.

These three forms are strong connecting links with *E. Luehmanniana*.

Following is a connecting link with *E. stricta* :—

(θ) A small tree from Middle Harbour, Sydney, about 9 feet high, with a white-grey smooth bark, the old bark leaving the tree in long dark-coloured shreds. Buds clavate, and with double operculum. Fruits about $\frac{3}{8}$ inch long, of the shape of those of *E. stricta*, but with a thicker rim, and less sunk, 4-celled. The leaves linear-lanceolate, 5 inches by $\frac{1}{2}$ inch.

Bark.—Lead-coloured; falling off in ribbons. Not greatly different from *E. stricta* and *E. obtusiflora*.

Timber.—Like *E. stricta*.

Seedling leaves.—Broadly lanceolate, somewhat similar in shape to the adult leaves, only larger. Approximate dimensions 4 to 6 inches long by $1\frac{1}{4}$ inch broad.

Mature leaves.—Rigid, very coriaceous, ovate-lanceolate, slightly oblique, leaves sometimes blunt, sometimes hooked; rarely 1 inch wide (usually $\frac{3}{4}$) and up to 4 inches or a little more long. The venation marked.* Colour of leaf pale or yellowish-green, often glossy, and the margin often reddish. The intra-marginal vein some distance from the margin. The transverse veins (see figure 22) starting out at a fairly uniform angle to the midrib. As Bentham puts it (B.Fl. iii. 189); "Leaf veins not close, often very oblique, but all inserted along the midrib."

Peduncles.—Somewhat angular.

Buds.—Clavate and umbonate, even pointed.

Calyx-tube.—Short and broad (Bentham), but this not a constant character.

Operculum.—Specimens from Botany and National Park have the operculum hemispherical, apparently without sign of umbo. This species frequently shows the double operculum.

Anthers.—In describing *E. stricta*, it has been alleged that Bentham has described the anthers of another species. He, however, emphasises the shape of the anthers where (B. Fl. iii. 218), alluding to the difference between *E. stricta* and *E. stellulata*, he says, "Some specimens, confounded with *E. stricta* by A. Cunningham, belong to the narrow-leaved form of *E. stellulata*, in which the veins are sometimes inconspicuous, but which is readily distinguished by the shape of the buds, the reniform anthers, &c."

Fruits.—4- to 5-celled, flat-topped, wrinkled, brown and shiny like *E. Luehmanniana*, but smaller. Some specimens from Loftus have slightly urceolate 4-celled fruits, which have thin rims, and are depressed.

* This is especially the case where the trees grow close to the coast.

Some fruits from Botany are almost hemispherical and 5-celled; they are apparently a connecting link with *E. stricta*. We are of opinion that it is not possible to discriminate between some forms of *stricta* and *obtusiflora* without fruits.

Range.—In its typical form confined to the coast, and apparently at no great distance from Port Jackson.

E. VIRGATA, Sieb.

The original description of *E. virgata*, Sieb., (*Cur. post.* 195) is as follows:—"E. operculo conico pedunculis 3-floris incrassatis compressis rugosis erectiusculis foliis lanceolatis acuminatis coriaceis subvenosis glabris."

This was expanded by De Candolle (*Prod.* iii. 217) into the following words:—

"Operculo conico cupulæ longitudine, pedunculis axillaribus lateralibus petiolo vix longioribus pedicellisque ancipitibus, foliis oblongo-linearibus utrinque acuminatis crassiusculis coriaceis subaveniis. Folia petiolus 4 lin. longus, lamina 4-6 poll. longa 6-9 lin. lata. Umbellæ 5-6-floræ. Margo folii crassiusculus."

It will thus be seen that Sieber had the temerity to describe the species from foliage and buds only—a course fraught with danger in the vast majority of species, as subsequent experience has amply shown. This imperfect description has been the cause of much trouble in later years.

E. virgata is redescribed by Bentham (*B.Fl.* iii. 202) . . . "Chiefly from Oldfield's, Woolls's and F. Mueller's specimens. Sieber's appear to be the same, but they are only in young bud, and, therefore, uncertain. It differs from both *E. coriacea* and *E. obliqua* in the outer stamens bearing only abortive anthers, and in that respect approaches *E. hæmastoma*, from which it differs as well in foliage and in fruit, as in these imperfect stamens being much fewer and rarely, if ever, quite without anthers."

E. virgata was in 1884 considered by Mueller (*Decade* 10, *Eucalyptographia*) as a form of *E. stricta*.

Previously, however (in 1880), the species was regarded by Mueller, in the same work, as a synonym of *E. Sieberiana* (Decade 2).

Bentham (B.Fl. iii. 202), in referring to *E. virgata* as "Mountain Ash" (Twofold Bay), a tree which is undoubtedly *E. Sieberiana*, adds to our difficulties. He refers to the true "Mountain Ash" (*E. Sieberiana*) in describing *E. virgata* as a tree with "furrowed persistent bark," and in other respects, in the same description, has the tree we now know as *E. Sieberiana* in view. *E. Sieberiana* is a name not employed by Bentham, being coined later by Mueller (*Eucalyptographia*).

We will discuss the matter further under *Sieberiana*, only adding, at this place, that Mueller's drawing of *E. Sieberiana* appears to us to more correctly depict a form of *E. hemastoma*.

E. virgata as a specific name was ignored by Mueller until the publication of the 2nd Census in 1889. The absence of a pictorial illustration by Mueller of *E. virgata*, as distinguished, from *E. Sieberiana*, is keenly felt under all the circumstances; in fact it does not appear that the species has ever been figured, except in the work alluded to (when considered to be synonymic with *E. Sieberiana*).

The differences usually empirically considered as separating *E. virgata* from *E. Sieberiana* are indicated as follows:—

E. virgata.—Stamens all fertile. Leaves always falcate. Plant always virgate.

E. Sieberiana.—Outer stamens sterile. With paler leaves than the preceding.

Such is a résumé of the affinities of what different botanists have considered to be Sieber's *virgata*. The conclusions being so unsatisfactory, and even contradictory, we determined to begin *de novo*.

We are indebted to the kindness of Mr. J. G. Luehmann for a specimen identical with Sieber's *E. virgata*, in bud only, collected in a coastal district of this colony, near Bulli.

We unhesitatingly refer it to one of the numerous forms between *E. Luehmanniana* and *E. obtusiflora*. Our determination confirms

the affinity of *E. Luehmanniana* and the so-called *E. virgata*. Sieber's *E. virgata* may be looked upon as either a glabrous form of *Luehmanniana* or a pointed-operculum form of *obtusiflora*. To speak as definitely as possible, we define it as a glabrous form of *E. Luehmanniana* (connecting with *E. obtusiflora*). It is an imperfectly described form oscillating between two species; it has remained a name for three quarters of a century, disturbing *Eucalyptus* nomenclature, and no one ever dared to figure it as a species.

All that remains is to give the name of *E. virgata* decent interment, and we look upon the absolute identification of Sieber's species as an important point in our paper. *E. virgata* perplexed us for years, and the more we examined into its identity the greater the confusion appeared.

Concluding remarks.—On reviewing a very large series of specimens we cannot but be struck with the points in which *E. stricta*, *E. obtusiflora*, *E. Luehmanniana*, and *E. hæmastoma* resemble one another.

While there are undoubted affinities between *E. obtusiflora* and *E. Luehmanniana* (and between these two and *E. hæmastoma*), the type forms are very different in appearance. Ampler opportunities for investigation have shown that there are connecting links between species of *Eucalyptus* which, at the time of describing them, were not apparent, and the application of names to many forms is preserved simply as a matter of expediency. It may be stated as our carefully formed opinion that the judicious application of names to varieties is expedient as it helps the student and observer, and introduces definiteness into this protean genus.

By the names we have adopted, we have indicated to some extent our opinion of the affinities of the various forms dealt with by us. At the same time, since there are connecting links between all the forms, it is possible for a botanist who holds strong ideas in regard to the consolidation of species, to adopt a classification different from our own. It is interesting, for instance, to view them as varieties of one comprehensive species—*hæma-*

stoma, *E. stricta* being the form most remote from the species referred to. Still there is much to be said in favour of this large species with its varieties, and examination of the various trees from this point of view brings out points of similarity and dissimilarity between them which perhaps would not otherwise have been presented to us.

EXPLANATION OF PLATES.

(See pages 794-795.)

AUSTRALIAN *TERMITIDÆ*.

PART III.

BY WALTER W. FROGGATT, F.L.S.

(Plates xxxiv.-xxxv.)

Genus *TERMES*, Linné.

Head large, rounded, elliptical or quadrangular; eyes moderately large, projecting, and finely faceted; ocelli present, oblique or oval. Clypeus moderately large; labrum broad and rounded; antennæ 13-20-jointed, longer than the head. Prothorax heart-shaped, flattened, smaller than the head; tibiæ spined; plantula wanting. Wings large, rounded at the tips, costal and subcostal nervures running parallel to each other but not connected by cross nervures from base to apex, median and submedian nervures distinct, oblique, nervures variable. Scapular shield small, cross suture transverse. Cerci cone-shaped.

Soldiers with large heads, jaws projecting well in front, toothed or sabre-shaped, but always regular and matching each other.

Many build large nests, but others live under logs, stones, &c.

TERMES LACTEUS, Froggatt.

(Plate xxxiv., figs. 2, 2a.)

Termes lactis, Froggatt, Agric. Gazette, N.S.W., May, 1897,
with Plate, p. 297.

Upper surface dark castaneous; antennæ and mouth parts light brown; under surface dark brown; wings fuscous; nervures brown; the whole insect covered with short scattered hairs extending over the wings. Length to tip of the wings 8, body $3\frac{1}{2}$ lines.

Head almost spherical, slightly longer than broad, convex on the summit, truncate in the front. Eyes circular, moderately large, projecting on the sides; ocelli well in front of the eyes, narrow and elongate. Antennæ long and slender, 19-jointed, springing from a cleft in front of the eyes, 1st joint very large; 2nd about half the length; 3rd small, annular; 4th to tip moniliform, gradually increasing in size, and becoming more stalked and turbinate at the extremity. Clypeus small, narrow, with median suture; labrum large, rounded in front; palpi long and hairy; jaws stout, with three sharp teeth at the apex, an angular one below, and a large one at the base. Prothorax not as wide as the head, broader than long, flattened upon the summit, arcuate in front, slightly curved upon the sides, running round to the hindmargin, and terminating in a slightly arcuate tip. Legs long, thighs of a uniform thickness; tibiæ slender, with two fine spines at the apex; tarsi long, with large claw. Wings broad, rather pointed at the apex, thrice as long as broad; scapular shield small, cross suture transverse, with four parallel nervures branching out of it; costal and subcostal nervures stout, running close together to the tip; median nervure running parallel through the upper half of the wing, branching out about the middle of the wing and each branch again bifurcated before reaching the outer margin of the wings; submedian nervure stout at the base, with three short stout oblique nervures, and from seven to nine more slender ones, three or four of which are forked. In the hindwings the median nervure branches out of the subcostal beyond the scapular shield, and the basal oblique nervures are shorter and sometimes more forked, but the oblique nervures of both the median and submedian are alike irregular in number and disposition in both pairs of wings in a great number of specimens examined. Abdomen short and broad, rounded at the tip, cerci short and stout, projecting on the sides

Soldier.—Head bright yellow; antennæ and palpi pale yellow; jaws ferruginous, with the tips black; lightly covered with long hairs; thorax and abdomen dull white, the latter thickly covered with short hairs. Length $2\frac{1}{2}$ lines. Head broadly rounded at

the base, with several pale lines or sutures sloping down to the base of the jaws; with a rounded short snout-like projection above the base of the clypeus, forming a rounded opening connected with a chamber in the head, from which the soldier when touched ejects a globule of milk-like fluid; antennæ long, slender, 16-jointed, similar in form to winged insect's, except the basal joint, which springing from a slight depression on the side of the head is somewhat longer; clypeus small; labrum triangular, broadest at the base, slightly round and sloping on the sides to a point, about a third of the length of the jaws; jaws sabre-shaped, without teeth, except a round knob at the base; slender, curved and crossing over each other at the tips when closed; palpi long. Prothorax not as broad as the head, rounded in front on either side, arcuate in centre, with slight median suture, and curving round on the outer margins to the apex. Abdomen narrow at the base, swelling out in the middle, rounded at apex; cerci large. Some specimens are striped down the centre of the back with two parallel mottled bands; these are very distinctly defined on all northern specimens.

Worker.—Head pale yellow, with a white trilobed mark in the centre and a dark spot on either side of the clypeus, the rest white. Length $2\frac{1}{2}$ lines. Head spherical; clypeus quadrate, longer than broad; labrum not as broad as the clypeus, spade-shaped, rounded at the tip; antennæ jointed, thicker than those of the soldier; jaws short and stout, a curved fang at the tip, two sharp curved teeth below, and two angular ones at the base. Prothorax deeply concave in front, rounded on the sides and behind. Abdomen large, elongate-oval; cerci small and slender.

A description of the termitarium of this species has been given in the introductory part of this monograph, and also in a popular paper in the *Agricultural Gazette*.

T. lacteus is our commonest destructive species, and in all cases known to me in which houses have been damaged by white ants about Sydney, I have found them infested with this termite.

The soldiers are very plentiful in all the nests, and are remarkable for their ferocity, never retreating when a colony is disturbed

until all the workers have found shelter. They are at once recognizable by the globule of milk-like secretion above the jaws, which they eject at the first alarm. The winged forms are found in the nests in October; a queen is always present, and complementary queens are sometimes met with.

Hab.—Sydney, Shoalhaven, Blue Mountains, N.S.W., and Southport, Queensland (W. W. Froggatt); Uralla, N.S.W. (Mr. G. McD. Adamson); Gunbower, Vic. (Mr. G. J. Perrin); Kalgoorlie, W.A. (Mr. G. W. Froggatt).

This species has a very wide range in this colony and Queensland; it both forms nests, and is commonly found under logs, tree stumps, and stones. My Victorian and West Australian specimens were obtained under logs.

TERMES FEROX, n.sp.

(Plate xxxiv., figs. 1, 1a, 1b.)

Upper surface castaneous; underside of the abdomen ochreous; legs and antennæ lighter coloured; wings dark fuscous, nervures brown; very hairy and rather slender in form. Length to tip of the wings $5\frac{1}{2}$, body $2\frac{1}{4}$ lines.

Head small, spherical, as long as broad, rounded behind, and slightly flattened on the forehead. Eyes small, round, projecting; ocelli small, elongate-oval in front of the eyes. Antennæ 16-jointed, springing from a cleft in front of the eyes; 1st large, stout cylindrical; 2nd shorter; 3rd smallest; 4th-9th hemispherical, increasing in size to the tip; 10th-12th turbinate; the terminal ones more stalked. Clypeus large, convex, arcuate behind, truncate in front with distinct median suture, rounded on the sides. Labrum large, broad and rounded in front; jaws short and broad, with four sharp angular teeth at the apex and a tuberculate one at the base. Prothorax not as wide as the head, longer than broad, heart-shaped, arcuate in the centre of basal margin, and sloping round the sides to the apex, flattened in the centre and depressed on the sides; legs short; thighs rather slender; tibiæ short, broadest at the tip with two stout ochreous spines; tarsi very hairy. Wings slender, rounded at the tips, four times as long as broad; scapular shield small, angular, with

cross suture transverse, indistinctly showing four parallel nervures; costal and subcostal nervures thick, running close together to the tip of the wing; median nervure very fine, passing through the upper half of the wing; submedian nervure in the centre of the wing, with four stout oblique nervures at the base and four more slender ones slanting towards the tip, second and last forked. Abdomen long, slender, rounded at the tip; cerci short and stout.

Soldier.—Head pale ochreous-yellow; antennæ pale yellow; jaws dark reddish-brown, black at the tips; the rest dull white. Length $2\frac{1}{2}$ lines. Head large, twice as long as broad, convex above, rounded behind, straight on the sides of the antennal cleft; forehead arcuate on the summit with a rounded knob on either side, and a smaller one in the middle forming a triangle sloping sharply down to the base of the clypeus, corrugated on either side. Antennæ rather long, springing from a rounded cleft, 15-jointed; 1st large, cylindrical; 2nd half the length; 3rd very small; 4th twice as long as the last, cylindrical, rounded at the base; 5th-6th shorter and broader; 7th-14th turbinate; last elongate-oval. Clypeus large, truncate in front, rounded on the sides; labrum broad, swelling out on the sides, and then contracting to a rounded tip, reaching half way up the jaws; palpi slender, nearly as long as the jaws; jaws long, slender, sabre-shaped, and crossing over each other at the tips, untoothed, but roughened along the inner edge with a small rounded knob at the base. Prothorax much narrower than the head, arcuate in front, rounded on the sides, and slightly arcuate behind; legs short, with the thighs thick, and armed with two spines at apex. Abdomen elongate-oval.

Worker.—Head and upper surface of thorax pale yellow, rest white. Length 2 lines. Head large, orbiculate; antennæ 15-jointed, thicker and compressed on the basal half; clypeus long, narrow, rounded in front, with median suture, and a reddish spot on either side. Prothorax small, slightly concave in front, rounded on the sides; abdomen large, elongate-oval; cerci large and prominent.

This species is common about Sydney, living in small communities under stones, or old earthen walls, and sometimes form-

ing their galleries in the sides of the termitaria of *T. lacteus*. Their galleries are very irregular but strongly built and of a pale chocolate-brown colour, but appear to have no regular structure or distinct nest. The soldiers are generally numerous; and when their retreat is cut off they turn round, snapping their slender jaws together with a distinct click; both they and the workers—which are very light-coloured—seem to dislike the light, rushing off under ground as soon as the nest is opened. Winged specimens were found on the 3rd of February in a nest under some stones about 18 miles from Sydney.

Hab.—Thornleigh, near Sydney (W. W. Froggatt).

TERMES MERIDIONALIS, n.sp.

(Plate xxxiv., fig. 3.)

Winged form unknown.

Soldier.—Head bright yellow, jaws dark ferruginous at the tips; antennæ light coloured at the base of each segment; thorax pale yellow, rest of insect white. Length $2\frac{1}{4}$ lines. Head spherical, a little longer than broad, rounded behind, sloping on the sides to the base of the jaws, convex on the summit; forehead rounded, fringed with a few long hairs, with a reddish spot on either side; antennæ 15-jointed; 1st very large springing from the side of the head; 2nd half the length and breadth; 3rd very short; 4th-11th moniliform; 12th-14th stalked, larger, and truncated; 15th elongate-oval; clypeus hidden, indistinct labrum broad, rounded at the tip and reaching to the middle of the jaws; jaws falcate, curving over each other at the tips, the inner edges smooth from the tip to about a third from the base where they are deeply cut into, narrow to the base where they again broaden out; palpi slender, long. Prothorax not as wide as the head, slightly concave in front, rounded on sides and apex; legs rather long and slender; tibiæ short, two basal spines long; tarsi long, terminal joint large, claws slender; abdomen elongate-oval, pointed at the tip, thickly clothed with fine hairs; cerci small, slender.

Worker.—General colour white, semi-transparent; head pale yellow. Length 3 lines. Head broad, convex, rounded behind,

longer than broad; median suture from the base merging into an angular white patch in the centre of the forehead; clypeus divided in the centre forming two rounded lobes, with a reddish spot on the outer edge; labrum large, rounded in front; jaws small, with two stout pointed teeth at the tip, tapering from the lower one to an angular tooth in the centre of the jaws, broad at the base; palpi slender. Prothorax small, truncate in front, sloping on the sides to hind margin; abdomen broadly oval; cerci small, slender.

Hab.—Palmerston, Port Darwin, N.T. (from the nest; Mr. N. Holtze; and Dr. Stirling, Adelaide Museum); North Queensland (Mr. C. W. DeVis, Queensland Museum); Mackay, Queensland (in dead logs; Mr. G. Turner); Moree, N.S.W. (in dead logs; Mr. F. Miller).

This is the species which constructs the remarkable “meridional” or “magnetic nests” found from near the Bloomfield River, North Queensland, to Palmerston, Port Darwin. I have never had an opportunity of examining these peculiar structures myself, but Mr. Dudley Le Soeuf informs me that they are found a few miles off the Bloomfield River. He says*:—“Some distance away from here, in the open country, the curious mounds of the Termites, called the Meridian White Ants, are found, but I was unable to visit them. They are said to build long narrow structures, always running from east to west, and never to vary from that direction.”

A short account of the form of these nests is given in the Cambridge Natural History, Vol. v. p. 18, with a sketch from a drawing by Mr. Walker.

Mr. Holtze, who kindly sent me soldiers and workers taken direct from the nests, though he was unable to find winged insects or a queen, also sent me photographs of the nests with the following notes:—“These nests average from 10 to 12 feet in length in the form of a wall, convex on one side and concave on the other, the sides respectively facing the rising and setting

* “A Trip to North Queensland”; Victorian Naturalist, Vol. xi. 1894, p. 25.

sun." He did not give me the exact width of the nests; but, judging from the photographs, they are about eight feet in height, with the top straight, crowned with irregular little turrets. These nests are about 10 miles inland from Palmerston.

In a recent paper Mr. Jack,* after giving an account of their structure, says:—"The reason of their being built at this angle is to secure the maximum of desiccation. They do not repair these nests in the long dry season; but when the wet season sets in repair all damages. Its safety lies in being dried as quickly as possible. In tropical latitudes it is obvious that this drying can best be secured by placing the longer axis of the structure north and south, so that the rays of the sun may beat upon it during the greater part of the day."

Professor Spencer states† that near Brinkley Bluff the Horn Expedition party came across a patch of the nests of these termites from 4 to 5 feet in height, of a bright red colour, about a hundred nests occupying half an acre of ground. Unfortunately no specimens were collected from them.

TERMES PARADOXUS, n.sp.

(Plate xxxv., fig. 2.)

General colour light brown; wings pale fuscous, darkest near the base; the whole insect thickly covered with long hairs. Length to tip of wing 5; to tip of body $2\frac{1}{2}$ lines.

Head oval, longer than broad, slightly flattened on the summit, with a pustular mark in the centre, forehead concave in front; eyes large, coarsely faceted, projecting on the sides; ocelli wanting; antennæ long, robust, springing from a cleft in front of the eyes; 18-jointed, 1st stout, cylindrical; 2nd smaller; 3rd smallest; 4th-17th large, stalked, turbinate; 18th oval; clypeus large, lobed, rounded behind; labrum large, rounded; palpi long; jaws small, angular, bearing 4 small teeth. Prothorax heart-shaped, not as broad as the head, arcuate in the centre of the front margin,

* Notes on the Meridional Ant Hill of the Cape York Peninsula. Proc. Royal Society, Queensland, Vol. xii. p. 99, 1897.

† Report Horn Scientific Expedition, Part I. 1896, p. 129.

rounded on the sides to the hind margin; flattened on the summit, with the sides depressed, a median suture; legs robust; thighs thick; tibiae slender, cylindrical, armed with two slender reddish spines; terminal tarsal joint and the claws long, slender. Wings long and narrow, rounded at the tips, four times as long as broad; scapular shield small, slender at the base, cross suture rather convex, with four parallel nervures branching out of it; costal and subcostal nervures stout, running parallel to each other to the tip; median nervure very fine, rather irregular, running through the upper half of the wing, unbranched; submedian nervure running through the middle of the wing, with five stout oblique nervures, and from 6 to 8 slender ones; in some specimens about half of them bifurcated. Abdomen slender, segments rather long, rounded at the extremity; cerci short.

Soldier.—Head light yellow, jaws dark ferruginous, black at the tips, rest dull white. Length $2\frac{1}{2}$ lines. Head large, longer than broad, rounded behind, concave on summit, sloping on the sides and contracted at the base of the jaws; behind the clypeus is a curious lobed marking of a lighter colour than the rest of the head; forehead projecting and hiding the clypeus; antennae springing from a cleft near the base of the jaws; 17-jointed; labrum large, parallel on the sides but rounded at the tip; jaws slender, untoothed, springing from the centre of the head, sabre-shaped, straight to near the tips which curve inwards; when at rest crossing over each other about the centre. Thorax like that of winged insect; legs stout; tibiae covered with short reddish spines, as well as the two stout apical ones. Abdomen slender, cylindrical, rounded at tip; cerci slender.

Worker.—Head light brown; rest dull white. Length 2 lines. Head almost spherical, convex on summit; forehead arcuate in front; clypeus large; labrum rounded in front; jaws small, angular, with five pointed teeth, 4th largest, and 5th smallest. Abdomen large, elongate-oval.

Hab.—Mackay, Queensland (Mr. G. Turner).

The specimens were taken from a small colony under a log, and are the only examples of this curious species I have seen.

TERMES RUBRICEPS, n.sp.

(Plate xxxiv., figs. 9, 9a.)

Winged form unknown.

Soldier.—Head and jaws bright reddish-brown; antennæ reddish, pale at base, dorsal surface of the thorax brown; the rest light brown; abdomen covered with short hairs, legs spiny. Length 3 lines. Head very large, broad, rounded behind, convex on the summit, and flattened on the forehead; sides contracting from the base of the antennæ to the jaws; antennæ long and slender, 17-jointed, springing from the side of the head near the base of the jaws; 1st joint large, cylindrical; 2nd smaller; 4th smallest, 5th-16th cylindrical, slightly stalked, and rounded at the tips; clypeus small, narrow, lobed; labrum broad, short, rounded at the tip; jaws long, slender, sickle-shaped, slightly irregular on the inner margin, a deep incision cutting into the fangs, followed by a large angular tooth springing out on either side in line with the tip of the labrum, the jaws curving over each other above the tip of the labrum; palpi long and slender, as long as the jaws. Thorax very small, rounded in front and on upper half of the sides, but much broader on the hind half; legs very long and slender; tibiæ cylindrical, with two large apical spines; tarsi hairy. Abdomen slender, elongate-oval; cerci long and slender.

Worker.—Colouration similar to that of the soldier. Length 3 lines. Head rounded behind, longer than broad, convex on the summit, flattened and sloping to the forehead; the latter arcuate in front, with the tips forming a projecting point on either side above the deep antennal cleft; antennæ 18-jointed, shaped as in the soldier; clypeus large, rounded behind, convex on the summit and slightly truncate in front; labrum short, broad, rounded in front; palpi long; jaws small, short, with two strong angular teeth at the apex, a smaller broad one below, and an irregular one at the base. Abdomen elongate-oval; cerci slender.

Hab.—McKinley Ranges, Central Australia (Professor W. B. Spencer).

The soldier of this curious termite somewhat resembles *Termes nigriceps* in the form of the jaws, but is a very distinct species in all other respects. It appears to be one of the common species in that part of Central Australia visited by the Horn Expedition, as Professor Spencer obtained several small colonies. A note with the largest lot states that they were taken from a nest at the roots of a tussock of spinifex grass.

TERMES SERRATUS, n.sp.

(Plate xxxiv., fig. 5.)

Winged form unknown.

Soldier.—Head bright ferruginous, darkest at the apex; jaws dark reddish-brown, black at the tips; antennæ and palpi light brown; prothorax pale yellow; rest dull white. Length 2 lines. Head slender, much longer than broad, rounded behind, summit convex; a slight median suture, merging into a transverse one; forehead rounded, with a stout tubercle projecting at the sides in front of the antennæ, truncated above the jaws; antennæ 13-jointed, slender; 1st large, cylindrical, 2nd smaller, 3rd smallest, 4th-13th gradually increasing in size and more turbinate towards the tip; clypeus large, lobed behind, almost round; labrum long, slender, broadest at the base, straight on the sides to the rounded spade-shaped apex; jaws very slender, projecting from the centre of the head, narrow at the base, nearly as long as the head, curving in at the tips and crossing; finely serrated along the inner margins; palpi long and slender, but not as long as the jaws. Thorax small; prothorax not as wide as the head, truncate in front, rounded on the sides and hind margin; legs long, thighs rather thick in proportion to their length; tibiæ stout, cylindrical, with two apical spines; tarsi slender. Abdomen elongate-oval; cerci small, conical.

Worker.—Head pale yellow, the rest white. Length 2 lines. Head round, slightly longer than broad, with sutures as in that of the soldier; antennæ springing from cleft on the sides of the head, 13-jointed, 4th-12th elongate, 13th elongate-oval; clypeus truncate behind, narrow, rounded in front; labrum broadest at

base, contracted at the extremity to a truncated tip. Prothorax very small. Abdomen hairy, elongate-oval; cerci small.

Hab.—Torrens Creek, N.Q. (Mr. J. H. Chisholm).

A small tube containing seven specimens, sent by this gentleman, but without information as to habits.

TERMES KRISIFORMIS, n.sp.

(Plate XXXIV., figs. 6, 6a.)

Winged form unknown.

Soldier.—Head pale yellow; jaws ferruginous; prothorax pale yellow, rest dull white. Length 3 lines. Head very long, slender, cylindrical, slightly rounded behind, sides straight to the base of the antennæ, where they turn sharply up to the base of the jaws; suture crossing head and meeting a transverse one, and forming an angular patch in the centre; forehead projecting in front, rugose and hiding the clypeus; antennæ 14-jointed, springing from clefts in the front of the head in a line with the base of the jaws; 1st very large, rounded at the tip; 2nd-3rd of about equal length; 4th smallest, oval; 5th-13th oval, more pyriform and increasing in size to the tips; 14th longest, oval; labrum long, broad at the base, slightly contracted to the apex, which is truncate, with a sharp point on either side; jaws narrow at the base, very slender, and rising upward, instead of produced straight in front of the head, and then bending down again, of an irregular thickness, curving round at the extremities into a hollow auger-like tip coming to a point. Prothorax very narrow, truncate in front, with rather angular sides running round to apex; legs rather long; thighs thick, tibiæ short, with two stout apical spines, claws large. Abdomen elongate-oval, with slender cerci.

Worker.—Head brownish-yellow, rest dull white. Length $2\frac{1}{2}$ lines. Head orbicular, rounded to the base of the antennæ; the latter 14-jointed; clypeus large, rounded on both sides and lobed in the centre; labrum narrow, rounded at the tip; jaws large and stout, with two broad pointed teeth near the tip. Abdomen broad, tapering towards the tip; cerci slender and hairy.

Hab.—Sutherland, near Sydney (W. W. Froggatt).

As far as I know this species is very local in its distribution. I have found several small lots in the above locality, forming irregular galleries under dead logs, but I have never found them anywhere else near Sydney.

TERMES ERRABUNDUS, n.sp.

(Plate xxxiv., fig. 4.)

Winged form unknown.

Soldier.—Head bright ferruginous, clypeus pale yellow, jaws black; antennæ and mouth parts pale brownish-yellow; legs and dorsal surface of the prothorax pale ochreous; rest dull white, lightly covered with short hairs. Length 6 lines. Head slightly longer than broad, convex on the summit, rounded behind, in the centre, flattened behind the forehead, a scroll-like mark receives a faint parallel suture from the base of the head; front of the forehead rugose, with a dark coloured patch on either side; antennæ 25-jointed, slender, tapering to the tips, and springing from a slight tubercle on the side of the head; 1st very large, swelling out at the apex; 2nd smaller, rounded on the sides; 3rd. 4th smallest, annular; 5th-19th moniliform; 20th to the tip pyriform, becoming smaller and more stalked to the terminal one, which is much smaller than the others; clypeus nearly quadrate, lobed, broader than long; labrum large, a little broader than long, narrow at the base, and fringed with hairs; jaws short, stout, rounded, curving over each other at the tips, with a large angular tooth about one-third from the tip, and a smaller one at the base; palpi slender, longer than the jaws. Prothorax not as broad as the head; divided down the centre by a depression, which forms the front into a rounded collar, and the apical half into a semicircular raised ridge, coming to a rounded point on either side; legs moderately long, stout, tibiæ armed with four spines at tip; tarsi long; claws large; plantula noticeable; inner edge of the thighs of forelegs covered with fine ferruginous spines. Abdomen short and broad; anal appendices large, slightly in front of the cerci; the tips of the four being nearly in a line.

Worker.—Head pale yellow, with spots on the forehead, base of jaws and tarsal claws ferruginous. Length 7 lines. Head

large, more rounded than that of the soldier, the scroll mark above the forehead very distinct, forming two white oval marks; the brown spots on either side of the clypeus very distinct; clypeus sloping on the sides; antennæ as in soldier except that the 3rd-6th joints are smaller and annular, jaws very large and strong, a sharp fang at the tip, two smaller ones below, and a broad one at the base. Inner surface of the forelegs much more thickly covered with fine spines. Abdomen long and cylindrical; cerci and anal appendices stout and hairy.

Hab.—Torrens Creek, N.Q. (Mr. J. R. Chisholm); Lyndhurst Station, N.Q. (Mrs. Black); North Queensland (Mr. C. W. DeVis, Queensland Museum); Hall's Creek, Kimberley, W.A. (Mr. W. O. Mansbridge).

This is the common large species of Northern Australia, where it gets into wood-work, and often does a great deal of damage. Mrs. Black sent me a tube full of workers and soldiers taken at a station about a hundred miles inland from Lolworth Station, Townsville.

Mr. Mansbridge sent me the following note:—"These termites were taken from a piece of timber lying on the ground; they are very destructive, and will in a very short space of time destroy deal boards (to which they are very partial) if left in a dark corner or shady spot."

TERMES PERNIGER, n.sp.

(Plate xxxv., fig. 3.)

Winged form unknown.

Soldier.—Head black, shining, jaws ferruginous tipped with black, antennæ and palpi brown, with the base of each segment light coloured; prothorax dark brown; legs and under surface brown, upper surface of thorax and abdomen light ferruginous. Length $3\frac{1}{2}$ lines. Head very large, as broad as long, broad at the base, rounded on the sides to the base of the jaws; convex on summit, flattened in front, and slightly arcuate on the forehead; antennæ long and slender, 17-jointed; 1st long, cylindrical, 2nd-4th cylindrical, 4th smallest, 5th-16th broader, rounded at the tips; 17th elongate-oval; clypeus hidden at the base, but showing two

rounded lobes in front; labrum large, broad at the base, rounded at the tip; jaws as long as the head, square at the base, curving out into two large sickle-like blades crossing each other in the centre when at rest, armed with a slender pointed tooth on either side, standing sharply out in a line with the tip of the labrum; palpi very long and slender, nearly as long as the jaws. Prothorax not as broad as the head, flattened on the dorsal surface, with an irregular median suture and a transverse impression in the centre; the front margin rounded, slightly arcuate in the centre; rounded on the sides to about the middle, where they swell out into a broad angular point round to the apical; legs very long and slender, the tibiæ covered with short spiny hairs as well as three stout spines at the tips, the 4th tarsal joint long and slender. Abdomen thickly covered with long hairs, constricted at the base, swelling out, and forming a broad rounded tip; cerci short and stout.

Worker.—Head ferruginous to dark brown, with pale suture crossing the centre of the head; prothorax ferruginous; rest light brown. Length $3\frac{1}{2}$ lines. Head large, rounded behind, a little longer than broad, forehead deeply arcuate on the sides, depressed in the centre behind the clypeus; clypeus slightly lobed in the centre, sloping on the sides to a rounded tip; labrum broad, rounded at the tip; jaws broad and stout, with two sharp angular teeth at the tip, and two broad flattened teeth towards the base; antennæ springing from a cleft, of the same form as in the soldier. Abdomen large, narrow at the base, swelling out near the centre, and sloping down to the extremity; cerci small.

Hab.—Kalgoorlie, W.A. (Mr. G. W. Froggatt).

The very dark colour, immense curved jaws, the long slender legs and antennæ make the soldier of this species very distinctive.

These very curious termites were found under a dead log upon the ground by my father, who says, "I found a numerous colony of workers and soldiers under a log unlike any other species about here. The soldiers were very savage, when touched exuding a white milky substance and biting so viciously that if once they

caught hold with their enormous jaws you could pull their heads off before they would let go."

Later on in the season my father sent the following note (Nov. 20th) with a tube containing some more specimens of this species: "My attention was drawn to a little lizard in front of my door very busy picking up something, which turned out to be these white ants. I had not seen any white ants for some months in any of the nests, but there had been a slight shower of rain in the morning. The ground was perfectly clear of timber or stumps and dry and dusty for a considerable depth, but these little miners were boring up from beneath and coming to the surface to carry down bits of grass lying upon the surface. Little black ants were also carrying them off as they appeared; by the time I had filled the tube they had all disappeared under ground again. I took a watering can and sprinkled the same ground next morning, but could not induce any more to come up, so they must know the difference between natural rain and irrigation."

TERMES TURNERI, n.sp.

(Plate xxxiv., figs. 8, 8a.)

General colour dark castaneous, head darkest, antennæ brown, the basal portion of each segment lighter coloured; legs and chitinous bands of undersurface of the abdomen light brown; wings fuscous; nervures darker. Length to tip of wings 5, to tip of body $2\frac{1}{2}$ lines. Head longer than broad, rounded behind, flattened on the summit, forehead arcuate; eyes large, circular, projecting well out from the side of the head; ocelli round, in a line with the front margin of the eyes; antennæ 13-jointed, short, slender, and very hairy, springing from a circular cleft in front of the eyes; 1st short, stout, cylindrical; 2nd very short; 3rd-5th short, rounded and thicker; 6th-12th larger, almost as broad as long, rounded at the base, truncate at apex; 13th rounded at the extremity; clypeus large, convex, lobed, truncate in front, rounded behind; labrum large, projecting, rounded at the tip; jaws with two sharp teeth at tip, lower part forming a broad flattened edge, arcuate in the centre. Prothorax not as wide as the head,

truncate and slightly arcuate in the centre, the sides and hind-margin forming a half-circle; meso- and meta-thorax large, flattened; legs rather long, thighs stout, tibiæ long, slender, the two apical spines large; tarsi long, claws large; wings four times as long as broad, rounded at the tips; scapular shield small, with the cross suture transverse, showing the base of four branching nervures, costal and subcostal nervures robust, running close together to the tip of the wing; median nervure branching out of subcostal beyond the cross suture, and running parallel through the upper half of the wing, turning downward towards the tips, sometimes unbranched, in other specimens divided into two, and again bifurcated at the tip; submedian with from 9 to 11 oblique nervures, the first five basal ones thickened, the bifurcation not constant. Wings thickly covered with fine hairs, forming a delicate fringe along the costal nervure. Abdomen long, cylindrical, of a uniform thickness to the rounded tip, thickly clothed with fine hairs; cerci very small.

Queen lighter coloured, with the chitinous plates of the abdomen light brown. Length of abdomen 1 inch, diameter $3\frac{1}{4}$ lines.

Soldier.—Head pale ochreous, darkest towards the apex, the jaws ferruginous at the base, black at the tips, the rest dull white. Length $2\frac{1}{2}$ lines. Head very large, longer than broad, rounded behind, rather straight on the sides, and rounded from the base of the antennæ to the jaws, the summit flattened, with the forehead raised forming an elevated patch divided by a median suture; clypeus narrow, slightly lobed in front; labrum broad at the base, rounded on the sides, covering the base of the jaws, and forming a spade-shaped tip; jaws long, slender, untoothed, springing from the centre of the head and crossing each other close to their base; antennæ 13-jointed, similar to those of winged form. Prothorax small, truncate in front, rounded behind; legs slender; abdomen large, elongate-oval; cerci small.

Worker.—Head brownish-yellow, with dark ferruginous spots on the sides of the forehead. Length 3 lines. Head slightly longer than broad, convex, with a median suture branching in the centre

of the forehead on either side of an angular patch, while the front margin of the forehead forms a raised crescent-shaped ridge, coming to a sharp point on either side in front of the base of the antennæ; clypeus large, convex, divided into two lobes; labrum large, rounded in front; jaws small, with two sharp teeth at the tip, and two large and hatchet-shaped below. Thorax small. Abdomen large, elongate-oval; cerci small and slender.

Hab.—Mackay, Q. (Mr. G. Turner).

This species is restricted in its range, as I have had it only from the vicinity of Mackay, where it is a common species. I am indebted to Mr. Turner for the following notes:—"The nests are plentiful and vary from one to two feet in height, of an irregular cone-shape, and eighteen inches in diameter at the base. The queen's cell was found about the centre of the nest but rather nearer the base, and was regular in form, measuring $\frac{3}{8}$ of an inch in height and $2\frac{1}{2}$ inches in diameter. Winged insects were noticed flying about the lights on the 29th of October, and several nests examined a few days later were found to be swarming with winged termites. The clay casing of the nests is in many instances occupied by colonies of *Formicidæ*, among which were *Bothnopoenera sublævis*, *Ectatomma convexum*, and a species of *Pheidole*."

The jaws of the soldiers are very distinctive, slender at the base; they stand out in front of the head, occupying only the central part of the front margin on either side of the labrum, and when at rest just touching at the tips, but when fighting crossing over each other right to the base.

TERMES AUSTRALIS, Walk.

(Plate xxxv., fig. 1.)

Termes australis, Walker, Brit. Mus. Cat. p. 523; Hagen, Mon. Term. p. 173, tab. III., f. 22.

General colour light ferruginous; head darker; prothorax lighter; wings hyaline, slightly iridescent, nervures brown; robust and rather hairy. Length to tip of wings 6, to tip of body 3 lines.

Head longer than broad, convex, flattened on the forehead; eyes large, round, slightly projecting; ocelli large, in front of the eyes; antennæ 20-jointed, springing from a cleft in front of the eyes; 1st joint stout, 2nd smaller, 3rd smallest, 4th-20th moniliform, elongated at tip; clypeus convex behind, narrow, rounded and lobed; labrum large, long, rounded at the tip; jaws short, broad, with 4 sharp teeth at apex, the second smallest, and a large double tuberculate tooth at the base. Prothorax as broad as the head, a little broader than long, truncate in front, slightly arcuate in the centre, sides rounded, convex behind. Wings three times as long as broad, ovate at the extremities; scapular shield stout, with the cross suture not so transverse as usual, showing the base of 4 branching nervures; costal and subcostal nervures running parallel (not so close as in most species) to the tip; median nervure slender, crossing through the upper portion of the wing, with a small bifurcation at the extremity; submedian nervure dividing the wing through the centre, with two short stout oblique nervures at the base, and from 8 to 10 finer oblique nervures occupying the lower half of the wing; the whole of the wing covered with very fine scales giving it a whitish appearance. Abdomen of a uniform width to the tip; cerci small.

Hab.—Adelaide, S.A. (Mr. J. G. O. Tepper).

This species was described from specimens obtained at Adelaide. Hagen redescribed it in his Monograph, stating he had seen pinned specimens of both sexes; he also adds that the workers and soldiers described by Walker with the winged ones have no relation to this species, but are those of an undescribed species of *Calotermes*.

My description is taken from a number of carded specimens, obtained by Mr. Tepper, flying round a lamp at night; but though it is the common winged termite about Adelaide, I have been unable to obtain soldiers and workers from a nest that I was satisfied belonged to the winged ones, but hope to do so before the season is over. Mr. Tepper believes that this species does not form any nests, but lives underground, and is the one locally destructive to houses and woodwork.

TERMES ACINACIFORMIS, n.sp.

(Plate xxxiv., figs. 7, 7a.)

General colour light brown tinged with ochreous; head light castaneous; wings hyaline, with nervures light brown, thickly covered with short brown hairs. Length to tip of wings $6\frac{1}{2}$, to tip of body 4 lines.

Head rounded on the sides, broad behind, truncate in front and sloping down on the forehead to the clypeus; eyes large, very prominent, and finely faceted; ocelli reniform, well in front of the eyes; antennæ 17-jointed; 1st shorter than usual, broadest at apex; 2nd smaller, cylindrical; 3rd smallest, rounded and compressed; 4th-17th turbinate, broader at the apex and increasing in size to the tip; 18th elongate-oval; clypeus narrow, sloping on sides from the base, slightly arcuate in front; labrum small, narrow, rounded in front; jaws long, with three pointed teeth near the tip, a broad one below and the base thickened. Prothorax slightly arcuate in front, broadly rounded on the sides, slightly flattened on the summit and deeply arcuate behind; legs robust, thighs short and thick, tibiæ slender, thickly fringed with spiny hairs and stout reddish apical spines; tarsi long, slender, claws large. Wings rather broad and short, more than twice as long as broad; scapular shield very small, cross suture transverse, showing 4 parallel branching nervures; costal and subcostal nervures very stout, running parallel close to each other to the tip; median nervure running through the upper half of the wing, bifurcate at the tip; submedian stout at base, with about 10 oblique nervures, the first four very stout, bifurcated soon after branching from submedian and again branching at their tips, the rest more slender, with irregular bifurcations; the whole wing finely granulated. Abdomen rather short, broad at base, rounded at the tip; cerci slender.

Soldier.—Head and prothorax bright yellow; jaws ferruginous, tipped with black, rest white. Length 3 lines. Head longer than broad, rounded behind, tapering from behind the base of the antennæ to the jaws; antennæ springing from a cleft on the side of the head, 17-jointed as in the perfect insect; clypeus hidden;

labrum short, broad at the base, coming to a sharp point at the tip in front; jaws untoothed, slender, scythe-shaped, curving over each other at the tips; palpi long, slender, hairy; prothorax not as broad as the head; legs slightly longer than in winged form. Abdomen short, very hairy, rounded at the tip; cerci large.

Worker.—Head pale yellow, the rest white. Length 3 lines. Head rounded, about as broad as long; flattened on the summit; antennæ 17-jointed, somewhat thicker than usual; clypeus small, narrow, truncate in front, divided in the centre by a median suture; labrum broad, rounded in front; jaws broad, stout, with 3 sharp teeth towards the tip and a broad square one at the base. Prothorax heart-shaped. Abdomen large, elongate-oval, with a curious dull brown angular pattern down the centre of the back; cerci large, hairy.

Hab.—Hall's Creek, Kimberley, W.A. (Mr. W. O. Mansbridge).

Mr. Mansbridge says:—"These termites were taken from the heart of a gum-tree some 20 feet from the ground, and had completely eaten the centre out of the tree, only a mere shell remaining; most of the trees in this district are eaten out in the same manner by this species."

The soldiers are very like those of *T. lacteus*, our common Sydney species, but the winged forms are very distinct from any other species I have examined. The thick costal and subcostal nervures and the curiously granulated wings are very characteristic.

TERMITINÆ.

Genus *EUTERMES*, Heer.

Head rounded, generally broadest behind; suture indistinct; eyes moderately large; ocelli reniform or sometimes narrow and oblique; clypeus large; antennæ 12- to 16-jointed, generally hairy, with the terminal joints thicker than the basal ones. Prothorax truncated in front, the sides and hindmargin forming a half-circle, sometimes depressed at the base; thorax generally narrow; plantula wanting, a small spine at the tip of tibiæ. Wings large, broad, usually fuscous or dark-coloured; scapular shield slender and the base of the parallel nervures not so distinct as in *Termes*; oblique nervures both variable in distribution and numbers.

Soldiers with nasuti or pike-shaped heads furnished with a chamber connected with the snout through which they can eject a drop of honey-like fluid; very small, and much more numerous in the nests in proportion to the workers than in other genera.

The members of this genus construct regular nests over tree stumps, grass, &c., and also rounded nests on the trunks or branches of trees connected by covered galleries leading up from the roots of the tree. Only a few species form irregular galleries under stones and logs.

The members of this genus have a world-wide range, but are most numerous in the tropics. Over thirty species have been described, more than two-thirds of which come from South and Central America.

Two fossil species have been described from Europe by Heer and Hagen.

EUTERMES MAGNUS, n.sp.

(Plate XXXV., fig. 6.)

Dark reddish-brown, the legs and basal portion of abdominal segments lighter-coloured, the undersurface ochreous, the head darkest, thickly covered with coarse hairs; the wings light ferruginous-brown with the costal and subcostal nervures darker. Length to the tip of the wings 14 lines, to the tip of the body 8 lines; breadth across the shoulders $1\frac{1}{2}$ lines.

Head rounded, swelling out and broadest behind the eyes, flattened on the summit, deeply arcuate behind the clypeus and forming an angular point on either side; eyes very large, round, and projecting on the sides, rather coarsely faceted; ocelli large, reniform, in front of the eyes; antennæ composed of 16 joints, stout and very hirsute; 1st joint large, cylindrical, springing from cavity beyond the inner margin of the eyes; 2nd and 3rd smaller; 4th to 15th turbinate, but becoming more cylindrical and less stalked to the tip; 16th elongate-oval; clypeus large, broad, rounded, and with slight median suture; clypeus narrow at the base, swelling out on the sides and rounded in front; palpi stout and very hirsute; jaws large, with two curved pointed teeth at

the tip, two smaller angular ones near the centre and the edge towards the base finely serrate. Prothorax not so broad as the head, thickly covered with stout hairs, concave in front, rounded and narrow on the sides and rounded behind, rather flattened on the summit, a dark median suture through the centre of the meso- and metathorax. Legs robust, moderately long and very hairy, thighs slightly curved; tibiae long, thickly covered with stiff spiny hairs, with two long spines at the apex; tarsi slender, with a fine spine at the apex of the first 3 joints as well as a thick coating of hairs; the 4th joint and tarsal claws large. Wings large, slightly more than three times as long as broad, rounded at the tip; scapular plate small, short, depressed on costal edge at the cross suture, the costal and subcostal nervures robust, running close together to the tip of the wing, the base of the first and the lower edge of the latter finely lined with yellow, the median nervure running through the upper half of the wing, with several fine nervelets branching out from its upper edge towards the subcostal, and forked at the tip; submedian nervure running parallel to the median but turning down behind the bifurcation of the former, with four stout convex nervures and six slender ones, the last forming a broad fork. Abdomen large, elongate-oval, broadest in the middle, the abdominal plates long, rounded at the tips and thickly covered with short hairs; cerci short, stout and cylindrical.

Queen.—Abdomen one inch in length and $3\frac{1}{2}$ lines in diameter, of a general white colour, the chitinous plates dark brown, covered with coarse hairs, and the intersegmental membranes covered with fine downy hairs. The antennae appear to be more slender and the spines upon the tibiae and tarsi more distinct.

Soldier.—Head dark castaneous, the rest ochreous-yellow with the centre of prothorax and the abdominal plates pale ferruginous. Length $2\frac{1}{2}$ lines. Head hemispherical, lightly covered with a few hairs, tapering in front to the snout which is nearly as long as the rounded portion of the head; palpi long and slender, but not reaching to the tip of the snout; antennae composed of 14 joints, long and slender, the apex of each much lighter than the basal

portion; 1st segment large, cylindrical, thrice the length of the 2nd; 2nd short, cylindrical; 3rd longer; 4th to tip elongate, slender at the base, broader and rounded at the apex. Prothorax narrow, almost straight along the front margin, rounded on the sides and behind; legs long, the thighs contracted at the base, stout, cylindrical; tibiæ long, with stout spines at the apex; tarsi as in winged insect. Abdomen large, very broad in the middle, rounded at the extremities; cerci large, conical and hairy.

Worker.—Upper surface of the head brown, with two spots in front and a pale suture through the centre of the head; the rest pale ochreous, with the centre of the dorsal plates slightly darker. Length $3\frac{1}{2}$ lines. Head broad, rounded, swelling out on the sides, but contracted at the base of the antennæ, the summit rounded, with a pale transverse suture above the clypeus meeting the cross suture through the forehead; antennæ 15-jointed, lighter-coloured but similar in form to those of the soldier; clypeus rounded behind and lobed, concave in front; labrum narrow at the base, sloping on the sides, broadest and rounded at the tip; jaws large, with two stout teeth near the tip, arcuate beneath, with a blunt tooth and an angular indentation below, swelling out again at the base of the jaw. Thorax very narrow. Abdomen large, elongate-oval, rounded at the tip; cerci rather small, conical.

I am indebted to Mrs. Black, of Lolworth Station, North Queensland, for this species and for an interesting account of their nests and habits. Mrs. Black says:—"This white ant builds a dome-shaped nest from 2-3 feet in height, and 3-4 feet in diameter, upon the dry basaltic ridges close to the homestead. I opened some nests in May, and found several queens. The black gins with me preferred to use their hands in excavating the centre of the nests, and soon became adepts in finding the queens."

About the middle of November Mrs. Black found a lot of winged termites flying about the house, and thereupon went out and examined a nest close to the house whence she obtained plenty of winged termites, with the workers and soldiers, which she brought down when visiting Sydney, thus completing the series.

This species is remarkable for the great size of the winged form in comparison with the soldiers and workers. The soldiers and workers also have much darker heads than any New South Wales species known to me.

Mr. J. R. Chisholm, of Torrens Creek, N.Q., sent me a rough sketch of the nest and a general account of the habits of this species, which is common about his homestead at Coalbrook Plains Station.

EUTERMES TRIODIÆ, n.sp.

(Plate xxxv., fig. 8.)

Upper surface of the head, thorax, scapular, and the abdominal plates castaneous; the rest pale ochreous; wings fuscous, the nervures darker. Length to the tip of the wings $5\frac{1}{2}$ lines; length to the tip of the abdomen $2\frac{1}{2}$ lines.

Head perfectly round behind, as broad across the eyes as from the base of the head to the front of the clypeus, the forehead sloping down, the whole thickly covered with fine hairs; eyes large, round, slightly projecting; ocelli large, irregularly oval, in a line with the centre of the eyes; antennæ composed of 15 short rounded hairy joints; 1st large, cylindrical; 2nd shorter; 3rd shortest; 4th to 14th broadly turbinate; last one elongate-oval; clypeus large, deeply divided in the centre and forming two prominent lobes sloping in on the sides and slightly truncated in front; labrum narrow, rounded in front; jaws moderately large, with a sharply curved tooth at the tip, deeply concave below, with an angular tooth below and a square edge towards the base. Prothorax broad, not as wide as the head, truncate in front, narrow at the extremities and broadly rounded behind, saddle-shaped. Legs moderately long; thighs thick; tibiæ long, slender; last tarsal joint long and slender; claws large and curved inwards. Wings three times as long as broad, rounded at the extremity; scapular shield small; costal and subcostal nervures running close together and meeting just at the tip; the latter much stouter than the former, the median nervure running through the upper half of the wing unbranched, the submedian nervure running very close to the median, with 11 to 12 oblique nervures,

the first six thickened, and the last two forming a narrow fork at the tip. Abdomen long, slender, rounded at the tip, with small cerci.

Soldier.—Head dark castaneous-brown, darkest on the sides and the base of the snout, the tip reddish-brown; antennæ ochreous, with both extremities of each segment lighter-coloured; dorsal surface of the prothorax and abdominal segment marked with brownish-yellow; the rest yellow. Length $1\frac{3}{4}$ lines. Head almost round to the base of the antennæ, with the apical portion produced into a rather short pointed snout, the head showing a slight suture through the centre; antennæ composed of 14 slender joints; 1st stout, truncate and cylindrical; 2nd smaller and shorter; 3rd more slender; 4th to 13th elongate, pyriform, becoming more rounded towards the tip, the terminal one oval, slightly stalked at the base; palpi extending beyond the tip of the snout. Prothorax along the front edge forming a raised ridge, coming to a rounded point at the sides and rounded behind, with a slight median suture running through the meso- and meta-thorax; legs long and slender; thighs nearly as long as the tibiæ; tarsi slender and hairy. Abdomen small, oval, rounded at the tip, covered with long hairs; cerci large and conical.

Worker.—Head pale yellowish-brown, with the centre of the upper surface dark brown, divided into two rounded patches by a pale yellow suture down the centre which meets a cross suture below the forehead, forming another transverse brown band and a dark spot on either side behind the labrum; the rest pale yellow; thoracic segments rather darker. Length of body 3 lines. Head very broad behind, rounded on the sides and summit, broader than long; clypeus very prominent, deeply divided in the centre into two convex lobes, rounded behind and on the sides, arcuate in front; labrum narrow at the base, sloping out to the rounded tip; jaws thick and stout; 1st tooth short and pointed, 2nd close beneath, much smaller, sloping out and forming a flattened edge to base; antennæ 14-jointed, slender, 1st segment large, 2nd about half the size, 3rd and 6th elongate, 7th-13th turbinate, the terminal one elongate-oval. Legs and thorax as in the soldier. Abdomen large, elongate-oval; cerci large, conical.

Mr. W. O. Mansbridge, Warden at Hall's Creek, Kimberley Goldfield, N.W. Australia, obtained the specimens from the nests, and also sent me a photograph of one close to his house, with the following information:—"These white ants are the common species about this district, and build their nests on the slopes of the slate ridges. They appear always to start them by swarming over a clump of spinifex (*Triodia*) grass, which is about two feet in height, and continue building their nests until they attain a height of from six to eight feet." Mr. Mansbridge's photograph shows an exceptionally tall nest, 14 feet in height, rounded at the base, and of a uniform diameter, but contracting at the summit into a rounded dome. He does not give me any information about its internal structure, but judging from a somewhat similar nest of *Eutermes* nearer the coast about Derby, King's Sound, it is probably thickly coated with earthy matter on the outer surface.

EUTERMES TUMULI, n.sp.

(Plate xxxv., fig. 9.)

General colour of upper surface castaneous, of under surface light brown; mouth-parts, legs, and antennæ pale ochreous, wings fuscous, nervures dark brown. The whole insect lightly covered with fine hairs. Length to the tip of the wings 6; to the tip of body 3 lines.

Head broad between the eyes, coming in sharply on the sides, from the antennal cleft to base of the jaws, convex on the summit, sloping down on the forehead. Eyes very large, circular, and projecting; ocelli large, reniform, in front of but contiguous to the front margin of the eyes. Antennæ 16-jointed, springing from a deep antennal cleft in front of the clypeus, 1st joint large, broad at apex, 2nd smaller, 3rd smallest, 4th to 9th uniform in size, broad and truncate at the extremities, 10th-15th more elongate and stalked, 16th elongate-oval. Clypeus large, deeply arcuate behind, sloping on the sides, and truncate in front; labrum broad, rounded in front, palpi long, hairy; jaws short and stout, with two stout angular teeth at the apex, a much shorter angular one below, and a lower hatchet-shaped edge. Prothorax large,

truncate in front; narrow on the sides and broadly rounded behind, but slightly depressed in centre. Legs long; thighs thick, rounded at the tip; tibiæ long, slender at the base; tarsi slender, long, claws large, spines small. Abdomen short and broad, cerci short, very broad at the base. Wings broad, rounded at the tips, more than thrice as long as broad; scapular shield small, with the base of the parallel nervures branching out close to the cross suture; costal and subcostal nervures very stout, running parallel to each other to the tip of the wing and thickened where they merge into each other; median nervure slender, running through the upper half of the wing, turning down and separating into four slender oblique nervures towards the tip of the wing; submedian nervure running very close to the median to the first fork, with ten oblique nervures, the first four stoutest, the third sometimes branched.

Soldier.—Head dull reddish-orange, snout brownish-black; legs and antennæ light brown; upper and lower surface of both thoracic and abdominal segments brown, with the segmental divisions barred with white. Length $1\frac{1}{2}$ lines. Head slender, rounded behind, sloping on the sides to the long slender snout; antennæ long and slender, 12-jointed, 1st joint large, cylindrical, rounded at the tip; 2nd small, narrow at the base, rounded at the tip; 3rd-4th slender, elongate and coalescing at the junction; 5th-11th elongate-oval; 12th rounded at the tip. Thorax very narrow, rounded, with raised collar or ridge in front. Legs long, slender. Abdomen elongate-oval, more slender than usual; cerci small.

Worker.—Head reddish-brown except at the base where it is light coloured, with a pale parallel suture through the centre meeting a transverse one, thus dividing the brown colour into four sections; antennæ and legs dull yellow; dorsal surface of the thorax light brown; abdominal segments darker, ventral surface lighter-coloured. Length 2 lines.

Head large, broad behind, convex, sloping down on the forehead, and contracted at the sides beyond the antennal cleft. Antennæ 15-jointed; 1st joint large, 2nd smaller, broadest at the apex; 3rd to 5th fusiform; 6th to 14th turbinate; 15th rounded at the tip; .

clypeus very large, convex, broadly oval, rounded on the sides; slightly truncate in front; labrum narrow, rounded in front; jaws stout, short, with two finely pointed teeth at the extremity, the lower one swelling out below with a small nipple, and an angulated tooth at the base. Thorax small, flattened on the dorsal surface, rounded behind. Legs rather short. Abdomen large, obese, and shorter than usual.

Hab.—Kalgoorlie, W.A. (from nest; Mr. G. W. Froggatt); Paisley Bluff, McDonnell Ranges, Central Australia (Professor Spencer).

Specimens of all forms of this species have been forwarded to me by my father, who says:—"It is the only mound-building species found in the Kalgoorlie district. The nests vary from a few inches in height and the same in diameter to 10 inches high and a foot in diameter at the base. I have seen none larger, and they are always situated under low scrubby bushes. When I first came to this district in the hot weather these nests were uninhabited, and the outer walls were so thin and dry that they crumbled under one's hand. Early in March we had some heavy thunderstorms that washed the outer shell off the nests, so that they look like a piece of coarse sponge full of irregular holes. After the storms the termites suddenly appeared, and on March 19th I found them mending up the walls of the nests, which, when restored, were of an irregular pyramidal form. I obtained workers, soldiers, and a few immature winged forms, but could not find a queen in a number of nests examined. After breaking up a nest I saw a great number of workers running about with small white particles which might have been eggs, but in all the nests there are great quantities of small grey globules which appear to consist of chewed up grass."

In the following October my father obtained a fine collection of winged forms, and also a lot of the "grey globules" before mentioned; the latter were submitted to Mr. H. G. Smith, of the Technological Museum, who analysed them, and informed me that they were simply masticated grass rolled up into little pellets.

Professor Spencer says:—"The nest of this species was found at the root of a spinifex bush, and was 1 foot 6 inches in height, and about 9 inches in diameter" (Horn Expedition, 1895).

EUTERMES PYRIFORMIS, n.sp.

(Plate xxxv., figs. 10, 10a, 10b.)

Immature.—Dull white, eyes reddish-brown. Length 5 lines.

Head longer than broad, rounded behind, narrow in front from the antennal cleft; eyes small; ocelli indistinct; antennæ 16-jointed, springing from a cleft in line with the eyes, 1st joint stout; 2nd half the length, rounded at the tip; 3rd smallest, rounded; 4th slightly larger; 5th to 15th turbinate; 16th oval. Clypeus narrow, lobed; labrum short, rounded in front; jaws broad, with two stout conical teeth at the tip, a broad axe-shaped space below, with a deep angular serration below, again swelling out at the base. Prothorax nearly truncate in front, narrow and sloping round on the sides and behind; legs stout, very hairy. Abdomen elongate-oval; cerci short and stout.

Soldier.—Head reddish-brown, smooth, shining and lightly covered with hairs; basal part of the snout black, tip reddish-brown; antennæ light brown, each segment distinctly barred with lighter colour at the tip; frontal ridge of prothorax brown; the rest light yellow. Length $2\frac{1}{2}$ lines.

Head broadly rounded behind, snout tapering, a little shorter than the oval portion of head. Antennæ 14-jointed, very hairy; 1st joint stout, long, cylindrical; 2nd smallest; 3rd to 13th elongate-oval, broadest and rounded at the tips; 14th shorter, rounded; palpi long, slender; labial palpi much longer than the snout. Prothorax small, truncate in front, with a distinct collar behind the neck, rounded behind; legs long; thighs stout; tibiæ very long, cylindrical, hairy; tarsi short. Abdomen elongate-oval; segments large; cerci large, stout, conical and very hairy.

Worker.—Head pale ochreous, dorsal surface blotched with brown, divided across the centre by an irregular pale suture, the rest dull white. Length 3 lines. Head as broad as long, rounded behind and on the sides, contracted in front of the antennæ;

antennæ 15-jointed, more moniliform than in the soldier; clypeus small, broadest in the centre, and tapering at the extremities, with a very distinct transverse median suture, and a brown spot on either side; labrum small, rounded in front; jaws showing only a curious chisel-shaped cutting edge without any angular teeth. Prothorax small, truncate in front, rather angular on the sides, rounded behind. Abdomen large, broad, oval.

Hab — Palmerston, Port Darwin, N.T. (from the nest; Mr. N. Holtze).

The specimens described were obtained from some of the largest "column ant hills" about ten miles inland from Palmerston by Mr. N. Holtze, but whether these are the same as those found in North Queensland I am as yet unable to say. Measurements from photos of nests taken by Mr. Holtze give them a height of about 18 feet, columnar in form, about four feet in diameter at the base, swelling out a few feet above, and then running up with a uniform width to the irregular pointed summit, and the sides ribbed with projecting buttresses. The nests are generally (if not always) in the first instance built up a dead tree trunk, which is gradually enclosed and coated with earth, while the wood is devoured and replaced with hard granulated woody substance.

Both the soldiers and workers are somewhat like those of *Eutermes fumipennis*, but the heads of both are much darker. I have been unable to obtain the winged insects, though Mr. Holtze has visited the nests several times on my behalf. I have some winged forms of a *Eutermes* taken round the lamps at night at Palmerston, which may be this species, but as they have not been identified I am holding them over.

EUTERMES HASTILIS, n.sp.

(Plate xxxv., fig. 7.)

Dorsal surface dark brown, ventral surface and legs lighter coloured, antennæ light brown, with the apex of each segment pale yellow; front of the head, sides of the body, and apex of the segments of the legs and tarsal joints dull white; wings pale fuscous, nervures brown, thickly covered with light brownish hairs. Length to tip of wings 6, to tip of body 4 lines.

Head broad, rounded behind, swelling out behind the eyes, sloping in towards the clypeus; flattened on the summit, and arcuate in the forehead, which is ornamented with a key-shaped mark in the centre; eyes large, circular, projecting; ocelli small, reniform, in front of the eyes and well in from the sides of the head. Antennæ 15-jointed; 1st very large, cylindrical; 2nd small, cylindrical; 3rd smallest, moniliform; 4th to 13th slightly increasing in size, turbinate; 14th somewhat larger; 15th elongate-oval. Clypeus large, convex, arcuate behind, rounded on the sides, truncate in front; labrum large; jaws short and broad, the terminal tooth rather blunt, with two angular and three more rounded ones, and an axe-shaped piece below. Prothorax slightly arcuate in front with the edge turned up, rounded on the sides to the base. Legs very hairy; thighs long, tibiæ very long and slender, with long apical spines; tarsi small. Wings long, broadly rounded at the tips, finely granulated; scapular shield short, only showing the base of costal, subcostal, and edge of first oblique nervures; costal and subcostal nervures stout, running close together to the tip; median nervure crossing the upper half of the wing, branching out into oblique nervures about a third from the base; these are variable both in number and bifurcations, but generally are six in number; submedian nervure very short, in most cases not reaching across more than half the wings, with eight irregular oblique nervures, but the 6th and 7th so deeply divided that there appear to be ten. Abdomen very hairy, large, narrow at base and broadly rounded at the tip; cerci small.

Soldier.—Head light reddish-brown, snout darker; antennæ and legs pale brownish; the rest dull white. Length $1\frac{1}{2}$ lines. Head broad behind, long, slightly compressed on the sides; snout short; antennæ slender, 13-jointed; 1st joint long, cylindrical, rounded at the apex; 2nd about half the size; 3rd to 5th long, slender, 6th to 12th larger, not so much stalked towards the tip and broader; 13th broad, oval; palpi long and slender. Prothorax narrow, ridged in front; legs long and slender; tibiæ very much longer than usual, tarsi small. Abdomen elongate-oval, broadest in the centre, and tapering on either side; cerci small.

Worker.—Head pale yellow; the rest dull white. Length 2 lines. Head as broad as long, broadest behind the antennal cleft; summit convex, showing an angular whitish patch behind, and a dark reddish spot on either side of the clypeus. Antennæ 15-jointed, like those of the winged insect; clypeus large, convex, arcuate behind, with distinct median and cross sutures; labrum large, sloping on the sides to a rounded tip. Jaws long, with two sharp pointed teeth turning upward at the tips, the lower one running down with a curve and a knob, a sharp angular edge below followed by a broad tooth at the base. Prothorax small, saddle-shaped, with front marginal ridge, sloping down on the sides to base; legs long, slender. Abdomen large, ovate.

Hab.—Mackay, Queensland (Mr. Gilbert Turner).

Mr. Turner says: "These white ants were obtained from a nest about a foot in diameter, and six inches above the surface of the ground." But no particulars were given of the internal structure.

The soldiers differ from both *E. fumipennis* and *E. fumigatus* in the bright ferruginous colour of the head, and are intermediate in size between the two. The winged form is darker-coloured, and larger.

EUTERMES FUMIPENNIS, Walk.

(Plate xxxv., figs. 4, 4a.)

Eutermes fumipennis, Walker, British Museum Catalogue.

General colour light reddish-brown, head castaneous; eyes black, under surface light brown; wings pale fuscous, nervures brown. Length to tip of wings 8; to tip of body $4\frac{1}{2}$ lines.

Head rounded behind, flattened on the summit, with a slight pale coloured median suture running from the back of the head to between the eyes; eyes very large, circular and projecting; ocelli elongate-oval; antennæ long, slender, 15-jointed, springing from antennal cleft well in front of the eyes; 1st joint stout, cylindrical; 2nd cylindrical, half the size, rounded at the tip; 3rd-14th of uniform length, turbinate, the terminal ones more truncate at the tips than basal ones, 15th elongate-oval; clypeus large, convex, arcuate behind, slender at the extremities, rounded

in front; labrum large, rounded in front; jaws large, stout, with two sharp curved teeth near the tip, the lower one prolonged into a chisel-shaped edge with a deep incision below; a stout angular tooth projecting beneath and sloping away to the base of the jaws. Prothorax small, slightly convex on summit, truncate in front, with the sides and base forming a half circle, slightly depressed at the back, mesothorax showing two large lobes between the base of the forewing. Legs stout, very hairy; thighs stout; tibiæ slender, tarsal spines on the hind legs large; tarsi short, claws large. Wings large, thrice and one-half as long as broad, rather narrow at the extremities; scapular shield moderately large; costal and subcostal nervures running parallel close together, and curving round the tip of the wing, joining in a slender point; median nervure running through the middle of the wing and curving downward about one-third from the tip, sending out two acute nervures besides the terminal one, which together with the last is bifurcated; submedian nervure only extending to the middle of the wing, sending out 9 stout, acute nervures, 7th and 9th bifurcated. Abdomen broad and stout, rounded at the tip; cerci small, conical.

Queen.—Head and thorax lighter-coloured. Abdomen 13 lines in length; 4 lines in diameter, cylindrical, segmental divisions only showing slightly upon the sides.

Soldier.—Head dark chestnut, snout black, antennæ brown, with the apex of each segment lighter-coloured. Length 2 lines. Head viewed from above pear-shaped, snout slender and pointed at the tip, with slight parallel suture. Antennæ 13-jointed; 1st very large, stout, cylindrical; 2nd about half as long, rounded at the tip; 3rd-13th elongate-oval, uniform in size. Prothorax small, saddle-shaped, with the front margin raised into a ridge. Legs long; thighs stout, tibiæ slender, broadest in the centre; tarsi small; claws large. Abdomen broad, oval; cerci small.

Worker.—General colour pale yellowish-brown; head broadly blotched with dark brown, forming a large rounded patch on either side, divided from each other by a light-coloured line, while another line runs into the back of each patch as well; a

reddish spot on either side of the clypeus. Length 3 lines. Head very broad and large, convex on the summit, flattened slightly on the forehead, sloping on the sides to the base of the jaws; clypeus very prominent, convex, broad and rounded behind, slightly lobed in the centre; labrum large, rounded; antennæ 13-jointed, springing from the antennal cleft behind the jaws; terminal segments more slender than those of the soldiers. Thorax very slender. Abdomen large, elongate-oval.

Hab.—Shoalhaven, Blue Mountains, Sydney, Newcastle (W. W. Froggatt); Southern Queensland, and Northern Rivers, N.S.W. (W. W. Froggatt); Mt. Lofty, S. Australia (Dr. Stirling); Gunbower, Victoria (Mr. George Perrin); Mackay, Queensland (Mr. Gilbert Turner); Kalgoorlie, W.A. (Mr. G. W. Froggatt).

This is the commonest species of the genus, with a very wide range over the greater part of Australia; wherever dead wood is found it is more or less in evidence, sharing with *Termes lacteus* the credit of doing more damage to woodwork than all the other species; but while the latter chiefly attack covered wood in houses, the former confine themselves more to fences and out-houses, and often eat out the roots and stems of cultivated plants that are dead or dying. They build the typical "negro head" arboreal nests on the trunks of trees, or small dome-shaped termitaria from six inches to two feet in height over stumps or logs. It is to this termite that the general description of the *Eutermes* nest and habits given in Part i. of this paper (pp. 433-5) has reference. In identifying this species as *Eutermes fumipennis*, Walker, I find in spite of his very brief description, which might apply to several, that it agrees in size and colouration; and though I have been unable to see the type in the British Museum, I think I can hardly be wrong in applying to my specimens Walker's specific name.

EUTERMES FUMIGATUS, Brauer.

(Plate xxxv., figs. 5, 5a.)

General colour dark brown, head darkest, smooth, shining; antennæ light-coloured at the apex of each joint; clypeus ochreous; thorax, legs, and under surface yellowish-brown; wings fuscous,

nervures dark brown. Length to tip of body 3; to tip of wings $5\frac{1}{2}$ lines.

Head short, broadest behind, convex, sloping down sharply above the clypeus, truncate in front; eyes circular, moderately large, projecting very slightly; ocelli small, elongate, curved, a considerable distance in front of the eyes; antennæ short, stout, and hairy, springing from a deep antennal cleft in front of the eyes; 14-jointed; 1st joint large, cylindrical, rounded on the top; 2nd similar in form, but only about half the size; 3rd very small; 4th to 14th of uniform size, stout, and broad at the extremities, moniliform; clypeus prominent, slightly arcuate behind, rounded on the sides, and nearly truncate in front; labrum large, broad, and rounded in front; jaws rather long, with two pointed curved teeth near the tip; three angular teeth below, the first joining the base of the lower curved one. Prothorax broad, slightly convex, truncate in front, with the sides running round to the hind margin; legs robust; thighs short and stout; tibiæ rather short; tarsi long; claws large. Wings more than thrice as long as broad, rounded at the tips; scapular shield small; costal and subcostal nervures moderately stout, running parallel to the tip of the wing, but hardly curving round; median nervure running straight across the middle half of the wings and branching into an angular bifurcation near the tip; submedian nervure rather slender, with six stout oblique nervures, and five or six slender ones, several of them forked, but both the number of the nervures and their bifurcations variable. Abdomen broad and short, thickly covered with brownish-yellow hairs; cerci small.

Queen.—Length of abdomen 7; diameter $2\frac{1}{2}$ lines. Thorax somewhat lighter-coloured than in the winged form.

Soldier.—Head ochreous, darker on the sides and snout; the rest pale brown, with the antennæ variegated by the segments being so much lighter at the tips. Length 2 lines. Head broad behind, tapering round to the snout, which is short and broad at the base; antennæ 13-jointed; 1st joint long, cylindrical; 2nd shorter; 3rd and 4th coalescing together, rounded; 4th shortest; 5th to 13th broad, turbinate; 13th oval. Prothorax small, with

front margin ridged, rounded on the sides, rather truncate behind. Legs long, slender; tibiæ of the forelegs short. Abdomen oval, tapering at the extremities, segmental divisions very distinct; cerci small.

Worker.—Head light brown, with a large blotch of darker reddish-brown covering the upper surface, slightly divided down the centre by a lighter band; legs, antennæ, and thorax pale brown; abdomen dull white. Length 2 lines. Head very broad behind, rounded on the sides, sloping in from the base of the antennæ; truncate in front; antennæ 14-jointed; clypeus large, truncate behind, rounded in front, but slightly arcuate in the centre; jaws short and stout, with two curved teeth at the tip, the upper one largest, at the base of the second a small indentation, arcuate, then curving out into a rounded ribbed edge at the base; thorax narrow, slender; legs long; abdomen, large, oval.

Hab.—Sydney, Shoalhaven, Newcastle, N.S.W. (W. W. Froggatt); Colo Vale, N.S.W. (Mr. Norman Etheridge).

This is a smaller species than *E. fumipennis*, with the head of the soldiers much lighter in colour. Though found in similar situations to the former it never builds nests, simply forming an irregular network of galleries under dead logs, sheets of bark, or stones, and sometimes attacking woodwork and old fences. The queen's cell is frequently broken when turning over a log and the queen and eggs exposed; winged ones were found in two nests under some large stones (at Thornleigh) about 10 miles from Sydney on November 1st. Mr. Adamson sent me eight supplementary queens, together with a number of immature winged ones, taken from a nest at Uralla. I have never found more than a single queen in all the nests I have opened.

My specimens agree with Brauer's, except that his are slightly smaller. I am greatly indebted to the kindness of the Director of the Naturhistorisches Hofmuseum in Wien for co-types of Brauer's species, which he generously presented to me, so that I have been enabled to carefully compare them.

EXPLANATION OF PLATES.

PLATE XXXIV.

- Fig. 1. —Head of soldier of *Termes ferox*, n.sp.
 Fig. 1a.—Wing of soldier " "
 Fig. 1b.—Jaw of winged insect of *Termes ferox*, n.sp.
 Fig. 2. —Head of soldier of *Termes lacteus*, n.sp.
 Fig. 2a.—Wing of soldier " "
 Fig. 3. —Head of soldier of *Termes meridionalis*, n.sp.
 Fig. 4. —Head of soldier of *Termes errabundus*, n.sp.
 Fig. 5. —Head of soldier of *Termes serratus*, n.sp.
 Fig. 6. —Head of soldier of *Termes krisiformis*, n.sp.
 Fig. 6a.—Labrum of soldier of " "
 Fig. 7. —Head of soldier of *Termes acinaciformis*, n.sp.
 Fig. 7a.—Wing of soldier " "
 Fig. 8. —Head of soldier of *Termes turneri*, n.sp.
 Fig. 8a.—Wing of soldier " "
 Fig. 9. —Head of soldier of *Termes rubriceps*, n.sp.
 Fig. 9a.—Jaw of worker of " "

PLATE XXXV.

- Fig. 1. —Wing of *Termes australis*, Walker.
 Fig. 2. —Head of soldier of *Termes paradoxus*, n.sp.
 Fig. 3. —Head of soldier of *Termes perniger*, n.sp.
 Fig. 4. —Head of soldier of *Eutermes fumipennis*, Walker.
 Fig. 4a.—Wing of soldier " "
 Fig. 5. —Head of soldier of *Eutermes fumigatus*, Brauer.
 Fig. 5a.—Wing of soldier " "
 Fig. 6. —Wing of *Eutermes magnus*, n.sp.
 Fig. 7. —Wing of *Eutermes hastilis*, n.sp.
 Fig. 8. —Wing of *Eutermes Triodia*, n.sp.
 Fig. 9. —Wing of *Eutermes tumuli*, n.sp.
 Fig. 10. —Wing of *Eutermes pyriformis*, n.sp.
 Fig. 10a.—Jaw of winged insect of *Eutermes pyriformis*, n.sp.
 Fig. 10b.—Jaw of worker of insect " "

NEW SPECIES OF AUSTRALIAN FISHES.

BY J. DOUGLAS OGILBY.

HARENGULA STEREOLEPIS, sp.nov.

Spratelloides delicatulus (not Bennett), Alleyne & Macleay, Proc.
Linn. Soc. N.S. Wales, i. 1877, p. 350.

D. 15-17. A. 16. Sc. 45/12.

Dorsal and ventral profiles about equally convex. Depth of body $3\frac{1}{3}$ to $3\frac{2}{5}$, length of head $3\frac{3}{4}$ to 4 in the total length; width of body $2\frac{1}{4}$ to $2\frac{1}{3}$ in its depth; depth of head $1\frac{1}{2}$ to $1\frac{3}{10}$, width of head $2\frac{1}{5}$ to $2\frac{1}{4}$, of interorbital region 4 to $4\frac{1}{4}$, diameter of eye $2\frac{4}{5}$ to 3 in the length of the head; snout $\frac{1}{5}$ to $\frac{1}{4}$ of a diameter shorter than the eye. Maxillary extending to the vertical from the anterior border of the pupil, its length $2\frac{1}{10}$ to $2\frac{1}{4}$ in that of the head, its width $2\frac{1}{4}$ to $2\frac{2}{5}$ in its length. 32 or 33 gill-rakers on the lower branch of the anterior arch, the longest $1\frac{9}{10}$ to 2 in the diameter of the eye ($5\frac{1}{3}$ to 6 in the head). Dorsal fin originating $\frac{1}{5}$ to $\frac{3}{10}$ nearer to the extremity of the snout than to the base of the caudal fin, its height $\frac{1}{10}$ to $\frac{1}{5}$ more than its length, and $1\frac{2}{3}$ to $1\frac{1}{2}$ in the head: length of anal slightly less than that of dorsal; ventral inserted below or a little in advance of the middle of the dorsal, and midway between the tip of the mandible and the base of the caudal or a little nearer to the latter, its length 2 to $2\frac{1}{5}$ in the head: pectoral with 15 or 16 rays, originating below the angle of the subopercle, $1\frac{1}{3}$ to $1\frac{1}{2}$ in the head: lower caudal lobe a little the longer, $3\frac{3}{4}$ to 4 in the total length. Scales firmly adherent, each with four or five vertical striæ and indistinctly pectinated margin; accessory scale of ventral lanceolate, $2\frac{7}{8}$ to $3\frac{1}{5}$ in the length of the head; abdominal scutes strong, 19 + 13. Upper surface of head rugose; parietal and postfrontal regions striated; opercle smooth. Vertebrae 45.

Back blue, sides golden, the colours passing gradually into one another; upper surface of head gray, the dorsal profile of the snout and the extremity of the jaws reddish-brown: dorsal and caudal with some dark dots: iris golden.

Etymology:—*στερεός*, firm or adherent; *λεπίς*, scale: so named in allusion to the adherence of the scales which can only be removed with the exercise of considerable force.

Distribution:—Torres Straits; Darnley Island; ?South-eastern New Guinea.

Type:—In the Macleay Museum, Sydney University.

This pretty little herring appears to be common in Torres Straits, whence numerous specimens now in the University Museum came; others are in the collection of the Australian Museum, but I cannot find any record of them. My largest example is 108 millimeters in length.

Alleyne and Macleay write of them thus:—"This fish was seen in enormous shoals at Darnley Island during the fortnight which the Chevert lay there. At that time—the early part of August—the whole northern shore of the island was literally black with them, and there would have been no difficulty, with proper appliances, in preserving hundreds of tons of these finest of all sardines."

DECAPTERUS LEPTOSOMUS, sp.nov.

D. viii, i 33-36 i. A. ii, i 25-28 i. L. l 115-117.

Body moderately compressed, its width $1\frac{1}{5}$ to $1\frac{2}{5}$ in its depth; depth of body $5\frac{1}{3}$ to 6, length of head $3\frac{2}{3}$ to 4 in the total length; depth of head $1\frac{2}{3}$ to $1\frac{4}{5}$, width of interorbital region 4 to $4\frac{1}{5}$, diameter of eye $3\frac{1}{3}$ to $3\frac{1}{2}$ in the length of the head; snout narrow and compressed, a little longer than the diameter of the eye; interorbital region flat; a feeble occipital keel. Maxillary extending to or not quite to the anterior border of the eye, its length from the tip of the snout $2\frac{2}{3}$ to $2\frac{4}{5}$, that of the mandible $2\frac{1}{4}$ to $2\frac{1}{2}$ in the head; width of maxillary $2\frac{3}{4}$ to 3 in its length. Upper jaw toothless, lower with a single series of small teeth; vomer

with two patches of teeth anteriorly and a long narrow band on the shaft; bands of teeth on the palatines, pterygoids, and tongue. 31 to 33 gill-rakers on the lower branch of the anterior arch, the longest 2 to $2\frac{1}{3}$ in the diameter of the eye. Origin of the first dorsal a little in advance of the middle of the pectoral, the third or fourth ray the longest, $1\frac{4}{5}$ to 2 in the head, the two last almost concealed in the dorsal groove; second dorsal originating a little nearer to the base of the caudal than to the extremity of the snout, the anterior rays the longest, not so long as those of the first dorsal: free anal spines moderately strong: ventral not reaching midway to the vent, the second ray the longest, $2\frac{1}{10}$ to $2\frac{1}{2}$ in the head: pectoral with 23 to 25 rays, extending to or a little beyond the vertical from the sixth dorsal spine, its length $1\frac{2}{3}$ to $1\frac{1}{2}$ in the head: caudal small, $5\frac{3}{4}$ to $6\frac{1}{2}$ in the total length. Cheeks, occiput, and breast scaly; two series of scales extending forward along the middle of the interorbital region; preorbital and preopercle with radiating muciferous canals. Lateral line gently curved to below the twelfth dorsal ray, the straight part shorter than the curved, with 25 to 28 spinose plates.

Blue above, silvery below the lateral line; a small black opercular spot: dorsal, caudal, and pectoral fins dotted with black.

Etymology:—*λεπτός*, slender; *σῶμα*, body.

Distribution:—Port Jackson.

Our Mackerel-Scad is known to the fishermen as a "small kind of Cowanyung," which is not so far astray, the true "Cowanyung" being, as far as can be conjectured from the description given to me, the adult Yellowtail (*Trachurus declivis*) or some closely allied species. It is said* to visit the coast every spring, and enters the harbours in company with the half-grown Yellowtails, but not nearly in the same numbers, only a few Cowanyung—restricting that name to the *Decapterus*—being found in a school of Yellowtail. My largest example measures 170 millimeters, and I am told that it rarely exceeds this length.

This species differs greatly from *Decapterus koheru*, Hector, and *D. ecclipsifer*, DeVis.

A CONTRIBUTION TO THE ZOOLOGY OF NEW CALEDONIA.

BY J. DOUGLAS OGILBY.

“On sait que les eaux douces de la Nouvelle-Calédonie renferment diverses espèces de Poissons, mais ils ne paraissent pas avoir été étudiés jusqu’ici.”

Crosse, Journ. Conch. Vol. xlii. (1894), p. 446.

The paragraph here reproduced gives the sum total of the information at present procurable about the fishes of this island, and it was in order to partially remedy this neglect that I took advantage of the decision of my friend and colleague Mr. Charles Hedley—on whose unvarying kindness and readiness to forward scientific work of any description I need not here dilate—to spend a short holiday in New Caledonia, to request him to procure for me any fishes which he might find time to collect, especially impressing upon him the interest which would attach to the fresh-water forms. Mr. Hedley spent about a month on the island, and though, owing to the meagre time at his disposal he was unable to pay any attention to the marine fish fauna, he nevertheless found time to spare from his own especial pursuits to make a collection from fresh-water streams, which is all the more valuable because of the care which has so evidently been taken in its preservation, and which has enabled him to place it in my hands in an absolutely perfect condition. The collection numbers no less than seventy-two specimens, representing six species and as many genera, reference to which will be made below.

A few words as to the position, history, and general features of the island may not be out of place here:—

New Caledonia is situated in the western portion of the South Pacific Ocean, roughly speaking between the parallels of 20° to

to 22° 30' S. lat. and 164° to 167° E. long., and has an area of 6,450 square miles, with a population of about 62,750.

“The natives of New Caledonia,” Mr. Hedley tells me, “are Melanesians allied to the Fijians; in former days they were, like kindred races, inveterate cannibals; civilised rule has now, however, stamped out this. Some years ago they made a vigorous attempt to strike off the French yoke, but the insurrection was crushed after much bloodshed. Now military posts are distributed throughout the island, and there is no danger of any serious disturbance. The natives are rapidly diminishing in numbers, and their total disappearance seems to be a matter of the near future.”

Notwithstanding that the island has now been for forty-four years under the dominion of France, a nation which justly prides itself on its scientific attainments, it is astonishing how little has been done to elucidate the fauna of this interesting colony; and in no branch is this neglect more apparent than in ichthyology, the study of all others, among the chordates at all events, which, one would think, should have commended itself to the notice of the residents.

A glance over the introduction to Crosse's paper convinces us that this favoured region, though so long settled and so comparatively close to the scientific centres of Australia, is still almost virgin ground to the biologist; it is hoped that the present short notice will draw attention to so important a subject, and induce some resident of the island to either provide us with a list of the species of fishes inhabiting its waters or forward collections to some recognised authority.

I do not anticipate the presence of any startling novelties, but the position of the island should make the study of its fauna and flora of great interest.

Mr. Hedley has kindly supplied me with the following interesting information:—

“On passing along the east coast a marked change is noticed when the traveller leaves the serpentine rocks, which yield the

nickel ore, and reaches the palæozoic formation succeeding them to the northward. The former are bleak and barren, with desolate uplands of bare red soil, patches of scanty fern, and thin brushwood, which, seen from the coasting steamer, suggest by their lifelessness the polar rather than the tropic zone. The latter rise wall-like from the sea, towering in Mt. Panic, the culminating peak of the island, to a height of about 5,400 feet. The crest of the range is clothed with dense jungle, its sides seamed with white leaping cataracts, and at its feet lie populous native villages hidden in cocoa-nut palm groves, the taro gardens of the kanakas, and the coffee plantations of the colonists.

“Twenty miles north of Mt. Panic, where the altitude of the coast range has diminished, lies the little settlement of Oubatche. Here, by the kind assistance of my hosts, Messrs. A. O. and J. Henry, I was enabled to collect the fresh-water fishes enumerated below. Our method was simply to block a small rivulet which flowed through an abandoned native garden in an alluvial flat near the sea, and bale a pool dry with buckets. As the water drained away the fish fell easy victims to the active native lads and were then transferred to my jar of formal. The small series of fish obtained did not of course exhaust the fauna of the neighbourhood. I saw several other kinds in the shallow streams which I was unable to catch, and I should expect that the mountain pools at higher levels, from two to four thousand feet, would yield different, perhaps peculiar species.

“On our arrival I observed two kinds of *Halobates* skimming over the surface of the pool, but they evaded my efforts to secure them. The molluscan tenants of the pool were *Isodora nasuta* and *Succinea montrouzieri* among the weeds, *Neritina variegata*, *N. canalis*, *N. bruguieri*, *N. petiti*, and *Navicella bougainvillei* were clinging to the rocks, and when the water fell *Melania arthurii* was seen crawling in the mud. Among crustacea, *Palæmon vagus* was plentiful, and a fresh-water crab, *Hymenosoma pilosa*, was caught. A spider, *Dolomedes* sp., was left among the water plants when the water subsided.”

ANGUILLA sp.

The four specimens of fresh-water eels brought back by Mr. Hedley form an excellent working series, as they vary in size from 236 to 647 millimeters. There can be no doubt as to the specific identity of these four, but the series proves to be of more than ordinary interest as a means of demonstrating the insignificance of some of the characters which have been considered of the highest importance in the determination of species among these fishes. Omitting all reference to such characters as are dependent upon the size of the eye, since it is now understood that this is co-ordinate with the degree of development to which the sexual organs have attained in each individual, I submit the following analysis, showing the principal differences which exist between the larger New Caledonian specimen and the three smaller ones.

Specimen *a*, 647 millimeters.

Head $6\frac{2}{3}$ in the total length, $1\frac{9}{10}$ in the trunk, $\frac{1}{10}$ more than the space between the gill-opening and the origin of the dorsal, and $\frac{1}{5}$ less than the distance between the latter and the vent; cleft of mouth 3 in the length of the head; space between origin of dorsal and tip of snout $3\frac{3}{4}$ in the total length; pectoral $3\frac{1}{2}$ in the head.

Specimens *b-d*; 236-345 millimeters.

Head $7\frac{1}{5}$ to $7\frac{2}{5}$ in the total length, 2 to $2\frac{1}{2}$ in the trunk, $\frac{1}{4}$ to $\frac{1}{2}$ less than the space between the gill-opening and the origin of the dorsal; and $\frac{1}{9}$ to $\frac{2}{9}$ more than the distance between the latter and the vent; cleft of mouth $3\frac{1}{2}$ to $3\frac{4}{5}$ in the length of the head; space between origin of dorsal and tip of snout $2\frac{9}{10}$ to $3\frac{1}{5}$ in the total length; pectoral $3\frac{9}{10}$ to $4\frac{1}{5}$ in the head.

In all the specimens the lateral bands of maxillary and mandibular teeth are divided into two sections by a naked longitudinal groove, the outer section consisting of a single series of enlarged, closely set, cutting teeth—similar to those of *Leptocephalus*—with the occasional addition, in the younger examples, of a limited

number of irregularly set smaller teeth on the outer side anteriorly. The vomerine band does not extend so far backwards but is wider than either of the maxillary bands; the shape of the band, however, differs *inter se*, being in the larger example subclaviform, in two of the smaller lanceolate, and in the remaining one foliate; while, therefore, the length and width of this band may in some cases be used as a distinctive character, it is evident that the shape is variable and consequently of no significance.

Taking Günther's "*Synopsis of the Species*"* as a basis of comparison, we find that my 'specimen a' belongs to group i., section A, subsection 2, in which "the length of the head is nearly equal to the distance between the commencements of the dorsal and anal fins," while 'specimens b-d' belong to subsection 3 of the same group, in which "the length of the head is conspicuously more than the distance between the commencements of the dorsal and anal fins."

In the first subsection referred to are placed *Anguilla labiata*, Peters, from the east coast of Africa, and *A. fidjiensis*, Günther, from the islands of that name. Omitting the former on account of its geographical distribution, we find that our specimen agrees fairly well with *fidjiensis*, the comparative length of the pectoral fin—a character on which I am not disposed to place much reliance—being the principal difference, while the anterior insertion of the dorsal fin is similar in both.†

To subsection 3 *Anguilla bengalensis*, Gray, and *A. reinhardtii*, Steindachner, are assigned by Günther, the former being described as "very closely allied to *A. latirostris*," although that species, which is identical with *A. anguilla*, is referred to a different section of the group, while *A. latirostris* and *A. anguilla* are themselves allotted to different subsections. The only dif-

* Catalogue of Fishes, viii. p. 24, 1870.

† Writing of *Anguilla Mauritana*, Günther remarks (*loc. cit.* p. 26):—"The principal character by which this species may be recognised is the advanced position of the dorsal fin;" a few lines further down he describes *fidjiensis* as having a still more advanced fin.

ferences between *A. bengalensis* and *A. reinhardtii* are the greater length of the tail and the shortness of the vomerine band in the former; but my experience with other apodal fishes—*Leptocephalus* and *Conger murcena*—leads me to the conclusion that too much reliance should not be placed on the first of these characters, which often degenerates into a mere racial distinction; and I can positively assert that any separation of the two species based on the length of the vomerine band is untenable, as that band is constantly shorter than those of the maxillary in the species which we have been accustomed to call *A. reinhardtii* from our waters.* Either, therefore, we have another species of Australian long-finned eel which remains to be re-discovered—a very doubtful supposition—or *A. reinhardtii* should be merged in *A. bengalensis*. Incidentally, I may mention that Day† remarks on a peculiarity of the Indian fish which it shares in common with our species; he writes, it “is much rarer on the hills than in the plains;” similarly all the specimens which I have seen from the mountain region of New South Wales belonged to *A. australis*, and though both species are equally abundant in the Liverpool and Camden districts, the latter is decidedly the scarcer on the coast.

From what has been already pointed out, it is plain that many of the characters which were relied on by Günther in 1870 are of no value for specific distinction, and that if the long-finned anguillids of India, Australia, and the south sea islands are to be kept separate other and more constant characters must be sought.

I shall make no further reference to the subject here, as I hope soon to be in a position to furnish a comprehensive review of the fresh-water eels of Australia and the South Pacific, when the question will be fully dealt with.

2. *KUHLLIA RUPESTRIS* HEDLEY.

Eleven examples of *Kuhlia* are among the fishes collected; these agree in most respects with *K. rupestris* (Lacépède), Boulenger, but some important and constant differences are

* Compare “Edible Fishes of New South Wales,” p. 188, 1893.

† Fauna of British India, Fishes i. p. 87, 1889.

noticeable, even though the latter author allows such an exceptionally wide margin of variation in some of the characters* as to lead to the belief that two or even more species are associated together under the name *rupestris*. In fact, further evidence than that adduced, even by so excellent an authority as Dr. Boulenger, is necessary before we can fully accept his determination of the identity of the five species described by Cuvier and Valenciennes. I may point out that Dr. Jordan, certainly as great an authority on fishes as any, does not admit the identity of the eastern Pacific *K. arge* with *K. taeniura*, though conceding its affinity, and that the difference in the size of the eye, relied upon by him, is not nearly so marked as in Boulenger's *K. rupestris*.†

While, therefore, the characters relied on by Boulenger in his analysis are accurately represented in our species, the following constant differences between the New Caledonian fish and the Queensland *K. haswellii*, Macleay (considered by Boulenger to be identical with *rupestris*), of which I have examined the types, may be noticed :—

Depth of body $2\frac{2}{3}$ to $2\frac{3}{4}$ in the total length; width of inter-orbital region $3\frac{1}{2}$ to $3\frac{3}{4}$ in the length of the head; vertical limb of preopercle smooth from just above the angle; fifth dorsal spine $2\frac{1}{10}$ to $2\frac{1}{5}$ in the head; last dorsal spine nearly as long as the fifth; third anal spine much longer than the second, $1\frac{1}{4}$ to $1\frac{2}{5}$ in the longest ray; ventral reaching somewhat beyond the vent; pectoral a little longer than the ventral; upper surface of head without conspicuous rugosities.

Length 130 millimeters *hedleyi*.

* The following may be taken as instances of the variation referred to :—
 “Diameter of eye $3\frac{1}{4}$ to 5 in the length of the head; longest dorsal spine $\frac{1}{3}$ to $\frac{2}{3}$ length of head,” &c. (*Boulenger, Catal. Fish. i. p. 37, 1895*).

† I trust that I shall be pardoned for remarking that much unnecessary trouble would be avoided and much of the disability, under which colonial biologists and others similarly placed as regards the want of books of reference rest, would be removed, if when giving the synonymy of a genus Dr. Boulenger had mentioned the type of each generic name. This little addition, so easy to him with the British Museum Library at his hand, so exceedingly difficult to us, would greatly increase the value of the catalogues to those workers who have not his facilities for reference.

Depth of body $2\frac{2}{3}$ to $2\frac{1}{2}$ in the total length; width of inter-orbital region $2\frac{2}{3}$ to $2\frac{3}{4}$ in the length of the head; vertical limb of preopercle denticulated throughout its entire length; fifth dorsal spine $2\frac{1}{3}$ in the head; last dorsal spine much shorter than the fifth; third anal spine a little longer than the second, $1\frac{3}{5}$ to $1\frac{2}{3}$ in the longest ray; ventral not reaching to the vent; pectoral equal to the ventral; upper surface of the head conspicuously rugose.

Length 270 millimeters *haswellii*.

Of course the disparity in the size of the specimens must be taken into consideration, but even giving this its full value some of the differences, such as that between the width of the inter-orbital region in the two forms, are quite abnormal.

3. CARASSIOPS GUENTHERI.

Eight examples, the largest 90 millimeters. I have already (p. 787) given my reasons for removing this handsome species from the genus *Asterropteryx* to which it had been ascribed by Bleeker.

4. ? OPHIOCARA APOROS.

Two specimens, the largest 144 millimetres.

5. ELEOTRIS FUSCUS.

The bulk of the collection belongs to this species, of which examples measuring 166 millimeters were brought back by Mr. Hedley.

6. TRICHOPHARYNX CRASSILABRIS.

Gobius crassilabris, Günther, Catal. Fish. iii. p. 63, 1861.

Three specimens, the largest 122 millimetres.

I have found it necessary to establish a new genus for this handsome Goby, as follows:—

TRICHOPHARYNX, gen. nov.

Gobius sp., Günther, Catal. Fish. iii. p. 63, 1861.

Body robust, cylindrical in front, compressed behind. Head large, wider than deep, with long rounded snout. Mouth wide, with short, nearly horizontal cleft, the lips thick and folded

laterally. Premaxillaries not protractile, the skin continuous in the mesial line with that of the snout; maxillary not reaching to the eye; upper jaw the longer. Teeth in the jaws in a narrow band, slender and recurved, the outer series enlarged, separate, firm; lower pharyngeal teeth setaceous; lips, entire inside of mouth, and tongue papillose. Nostrils approximate, the anterior with a raised rim, the posterior small, round, and simple, well in advance of the eye. Eyes supero-lateral, small, approximate, and somewhat prominent. None of the bones of the head armed. Gill-openings narrow, not extending forwards to below the angle of the preopercle, the isthmus wide; five branchiostegals, the three middle ones in contact basally, widely separated from the outer pair; gill-rakers represented by a few short thick fleshy tubercles. Two dorsal fins, the first with six flexible spines, the second with ten branched rays; anal with ten branched rays, originating behind the second dorsal; ventral inserted below the base of the pectoral, with five rays, the free basal membrane well developed and continuous; pectoral obtusely pointed, with 16 rays, the middle ones the longest; caudal rounded, the peduncle short and deep. Genital papilla moderate, sexually dissimilar, scales irregularly arranged especially in front, those of the tail largest; head naked, except a portion of the occiput and the upper edge of the opercle. No conspicuous series of pores on the head. Vertebrae 26 (11 + 15). Herbivorous.

Etymology:—*θρίξ* (gen. *τριχος*) a hair or bristle; *φάρυγξ*, throat: in allusion to the setaceous pharyngeal teeth.

Type:—*Gobius crassilabris*, Günther.

Distribution:—Australia; New Caledonia.

The three following species were taken on the reefs:—

MURÆNICHTHYS MACROPTERUS.

One small example.

PERIOPHTHALMUS KOELREUTERI.

Three immature specimens.

PLATOPHRYS PANTHERINUS.

A single specimen, 188 mm. in length

OBSERVATIONS ON PAPUAN LAND AND FRESH-
WATER SHELLS, WITH DESCRIPTIONS OF NEW
SPECIES FROM NEW GUINEA AND WESTERN
AUSTRALIA.

BY C. F. ANCEY.

(Communicated by C. Hedley, F.L.S.)

(Plate xxxvi.)

Some of the shells mentioned in the following paper were forwarded to me, a little time ago, by W. W. Froggatt, Esq., who collected them during his journeys to New Guinea and N. W. Australia; a few others were obtained from a German dealer and come from the portion of the island belonging to Germany.

Besides these, I avail myself of the opportunity of speaking about Papuan species recently described by MM. Smith, Brancsik and myself, which seem to deserve special attention.

First, a paper published by Dr. C. Brancsik (*Contributiones ad faunam Molluscorum insulæ Papua*) in the "Naturwissenschaftlichen Vereines des Trencséner Comitatus" has appeared in 1895, I think, after the publication of my pamphlet on the same subject, incorporated in the "Proceedings of the Linnean Society of New South Wales" for 1895. In this paper Dr. Brancsik described (p. 222) and figured *Hemiplecta divergens*, which, although somewhat different in shape and elevation of spire from my *H. granigera*, appears to be very close to it, if not quite identical. The same author has named *Pupinella luteola* (p. 225) another species which is undoubtedly identical with *P. Fultoni*, Smith (*Ann. and Mag. of Nat. Hist.*, 1895, November, Vol. xvi. p. 365, Pl. xx. fig. 17). Which name has the priority is questionable. I

must mention also that I got from Dr. Staudinger *Pupina enoptrum*, von Möll., which, upon examination, proved not to differ from Smith's *Pupina nasuta* (Smith, *loc. cit.*, p. 364).

1. *SULCOBASIS LEPTOCOCHLEA*, Ancey, n.sp.

(Plate XXXVI., fig. 1.)

Testa globosa, pro sectione tenuiuscula, pervie profundeque umbilicata, brunneo-rufa, unicolor, lineis incrementi tenuibus et obliquis per longitudinem sculpta et sulcis obsoletis spiralibus, in ultimo anfractu et inferne præsertim exarata, subnitida. Spira conoidea, satis producta, apice sat minuto, obtusiusculo. Anfractus 6 convexi, regulariter accrescentes, sutura impressa; ultimus magnus, rotundatus, tumidus, antice sublonge deflexus, infra submalleatus, circa umbilicum apertum et modicum subcompressus. Apertura leviter obliqua, basi antrorsum protracta, sublunata, rotunda, fauce purpurascens. Peristoma ad dextram vix, infra magis expansum, ad basin et præsertim ad columellam dilatatum, purpurascens, margine columellari candido, late reflexo, cum supero convergente, supero et extero regulariter incurvis. Callum parietale nitidum.

Diam. max. 44, min. 39, alt. 41, alt. apert. 23 mill.

Hab.—German New Guinea.

This handsome shell has been sent me as "*Sulcobasis*, nov.sp.," and I am not aware that it has been described. My unique specimen, although dead, is not liable to be confounded with any Papuan species I am acquainted with. It is probably more nearly related to *Sulcobasis Beatricis* (Fauna Malac. della Nuova Guinea, p. 163, Pl. iv. fig. 14) than to *S. Rehsei*, v. Mart. (= *Gerrardi*, E. A. Smith) and *S. Minnegerodi*, Strub., of S.E. New Guinea, but it differs from *Beatricis*, of Tapparone-Canefri, of the Fly River, in being smaller, of lighter substance, in having a much higher spire, more slowly increasing volutions (6, not $5\frac{1}{2}$ as in *Beatricis*) and less numerous and conspicuous spiral sulcations. The shell is rather thin for the genus.

2. CHLORITIS MOELLENDORFFI, Ancey, n.sp.

(Plate xxxvi., fig. 7.)

Testa globoso-depressa, aperte pervieque umbilicata, lute ovel purpureo-fusca, setis brevibus in quincunciis dispositis undique hirsuta, haud nitida. Spira convexa, obtusa, plus minusve elevata. Anfractus 5 convexi, regulariter crescentes, sutura valde impressa; ultimus altus, rotundatus, tumidus, antice paulatim descendens, circa umbilicum circularem et mediocrem vix compressus, minime angulatus. Apertura subobliqua, basi leviter antice protracta, regulariter rotundato-sublunata. Peristoma subincrassatum, extus lividum, intus purpurascens, undique breviter expansum, reflexiusculum, marginibus conniventibus, basali reflexo, columellari dilatato.

Diam. max. $22\frac{1}{2}$, min. vix 18, alt. 15, alt. apert. $11\frac{1}{2}$ mill.

Hab.—Tuom, German New Guinea.

I venture to separate this species from *C. eustoma*, Pfr., which is absolutely the same as *C. erinaceus*, Pfeiffer (*vide* E. A. Smith, Proc. Zool. Soc., June 2, 1885, p. 594), and which is, as far as I can ascertain, peculiar to the Solomon Islands, not only on account of the very different locality, but also of the characters which appear to be fairly constant in both forms. *Chloritis Möllendorffi* always has a convex, not planulate, spire; it has not the last whorl roundly shouldered as in *eustoma*; the aperture is not so oblique and the outer lip somewhat thinner; besides the umbilicus, although of about the same size, is not obtusely keeled as in that species, and the margins of the peristome not so remote from each other.

Many years ago I received from Mr. John Brazier a very similar shell from New Britain labelled *Helix discordialis*, Fér., but it has but little to do with the latter. The true *discordialis* has a widely expanded peristome, it is more depressed, and its spire also is less elevated.

* * *

3. *TRACHIA FROGGATTI*, Ancey, nov.sp.

(Plate xxxvi., fig. 2.)

Testa lenticularis, biconvexa, depressa, solidiuscula, mediocriter umbilicata (umbilicus ex parte tectus), superne undique denseque granulata, granulis infra carinam ultimi anfractus lævioribus, basi circa umbilicum paulatim evanidis. Spira convexa vel conoideo-convexa, obtusa, parum elevata. Anfractus 5 convexi, regulariter et sat lente accrescentes, sutura impressa; ultimus carina mediana acuta exsertaque cinctus, basi lævior, pallidus, lineis incrementi sculptus, antice leniter deflexus. Apertura obliqua, extus angulata, lunato-suboblunga, transversa. Peristoma incrassatum, album, undique expansum et reflexum, ad columellam dilatatum, marginibus parum conniventibus, callo tenui junctis. Color stramineo-carneus, infra carinam albidulam fuscescens, basi albidus.

Diam. maj. $16\frac{1}{4}$, min. 13, alt. $7\frac{1}{2}$ -8 mill.

Hab.—Oscar Range, N.W. Australia (Coll. W. W. Froggatt).

Judging from the external appearance only, I should have located this remarkable new species in *Plectotropis*, a group hitherto confined to Eastern Asia and the adjacent islands, including Malaysia, for it much more resembles some Chinese and Japanese forms like *Helix trichotropis*, Pfr., *squarrosa*, Gould, than other Australian species, save perhaps *Helix Howardi*, Angas, also a keeled species from the interior of South Australia, which is located by Pilsbry in his section *Glyptorhagada*. Its peculiar shape, keel, granular surface, reflected peristome, lustreless aspect (except around the umbilicus) and colour may easily separate it from any of the *Helices* recorded from the same region by Mr. E. A. Smith (*vide* Proc. Malac. Soc. Vol. i. 1894, pp. 84-99).

4. *TRACHIA ORTHOCHEILA*, Ancey, nov.sp.

(Plate xxxvi., fig. 4.)

Testa orbicularis, depressa, nitida, umbilicata (umbilicus mediocris, vix ex parte tectus), lineis lævibus incrementi confertisque

tantum sculpta, supra fulvescens, passim obscure substrigata, ad suturam penultimi pallidior, zona peripherica albida sat angusta, infra late corneo-fulvescente marginata cingulata, basi lactescente-albida. Spira convexa, parum elevata, late subconoidea, obtusa. Anfractus 5 regulariter convoluti, lente accrescentes, convexiusculi, sutura impressa; ultimus depressus, initio tantisper subangulatus, leviter antice descendens, basi haud inflatus. Apertura obliqua, transverse oblonga, lunata. Peristoma album, incrassatum, anguste reflexum, marginibus parum conniventibus, basali subelliptico vel rectiusculo, paulo magis crasso, imo ad dextram interdum subtuberculifero, columellari leviter dilatato.

Diam. maj. 13-14; min. $11\frac{1}{4}$ - $12\frac{1}{2}$, alt. $6\frac{1}{4}$ -7 mill.

Hab.—Oscar Range, 100 miles inland, Derby, King's Sound, N.W. Australia (W. W. Froggatt).

From the several specimens kindly sent by Mr. Froggatt, it will be seen that the above described shell is very different from its ally, *Helix* ("*Chloritis*") *rectilabrum*, E. A. Smith (*loc. cit.*, p. 88, Pl. VII., fig. 14), said to have been found at Parry Harbour, N.W. Australia. It has nothing of the peculiar epidermis and granular surface of that species and is a shining shell, quite similar in texture and colour to *Campylæa ichthyomma*, of Austria. Moreover, it is easily distinguished from *rectilabrum*, which seems to be an unbanded species in the character of the basal edge which is not so rectilinear in *orthocheila* as in *rectilabrum* and often provided, at its junction with the right margin, with a somewhat tuberculous thickening.

I think this, as well as *T. Froggatti*, *monogramma*, *millepunctata*, *rectilabrum*, *Baudinensis*, *Collingei*, *cyclostomata* and *Tuckeri* belong rather to *Trachia* than to *Chloritis* and *Gonostoma*, in which genera Mr. E. A. Smith has located some of them.

5. TRACHIA MONOGRAMMA, Ancey, nov.sp.

(Plate XXXVI., fig. 3.)

Testa orbicularis, aperte pervieque sed mediocriter umbilicata, oleoso-nitens, obsolete lineis incrementi et oblique striatula, tenuis,

corneo-albidula, basi sublaetescens ad suturam penultimi dilute fuscula. Spira concolor, obtusa, depressa, parum elevata. Anfractus $4\frac{1}{4}$ regulariter sed celeriter accrescentes, convexi, sutura impressa; ultimus rotundatus, parum depressus, basi convexus, satis altus, antice longiuscula et perparum deflexus, supra medium zona fusca angustiore cinctus. Apertura ampla, distincte obliqua, rotundata, transverse subovalis, lunata. Peristoma expansiusculum, tenue, basi intus incrassatum, expansum, ad columellam magis dilatatum, album, marginibus subconniventibus.

Diam. maj. $15\frac{1}{2}$, min. $12\frac{1}{2}$, alt. $8\frac{1}{2}$ mill.

Hab.—Oscar Range, with the preceding species (W. W. Froggatt).

A single specimen was sent, and it much differs from any other W. Australian species enumerated by Mr. E. A. Smith, the nearest allies perhaps being *Helix millepunctata*, Sm., (from Baudin and Cassini Islands), and *H. Bathurstensis*, Sm., (from Heywood and Bathurst Islands), but they differ much in texture, colour, sculpture, and number of whorls. *T. monogramma* looks indeed very much more like some Asiatic species (*T. propinqua* and others) than any Australian species known to me. It resembles *Helix similis*, but is thinner, more depressed and certainly belongs to another group.

In the lot of shells obtained by Mr. Froggatt there were also specimens of the following:—

RHAGADA BURNERENSIS, E. A. Smith.—Oscar Range, W. Australia. The examples agree pretty well with the original diagnosis, but the ground colour is not white, but pale greyish-brown, luteous-brown towards the aperture and the suture is margined with a fulvous line. The peristome also is fulvous.

I think this and the allied species are better placed in *Rhagada* than in *Hadra*, as Mr. Smith suggested, although they lack the characteristic markings of that genus.

RHAGADA REINGA, Gray.—Oscar Range. All exhibit the median brown line; the other ones are quite variable. One example is much smaller than the typical ones, measuring only 12 mill. in diameter, while the largest measures 17 mill.

Succinea scalarina, *Pfeiffer*.—Lennard River, 100 miles inland from Derby, W. Australia.

Vivipara decipiens, *Tapp.-Can.*—Two specimens said by Mr. Froggatt to have been taken by him in the Lennard River with the following species, but this may prove to be a mistake, as both are described from shells collected in the Fly River, British New Guinea, where Mr. Froggatt also probably found his specimens.

Vivipara (*Glaucostracia*) *Paulucciana*, *Tapp.-Can.*—This is a very remarkable species of *Vivipara*. Of the two specimens sent one contained the operculum, and in the last whorl there were two young globular and naticoid shells, very thin, spirally striate, consisting of about 3 whorls and keeled above the periphery; hence it may be inferred that *Vivipara Paulucciana* is viviparous like the typical forms; the operculum, of a reddish-purple hue, is not dissimilar from that of the ordinary species; however the shell differs very much in its *Lacunoid* shape, keeled umbilical area and umbilicus from that of typical *Vivipara*, and forcibly reminds one of the Indo-Chinese genus *Chlorostracia*, Mab.,* which, however, belongs to another family, and I should suggest for it the subgeneric name *Glaucostracia*.

Plotia pagoda, *Lea.*—Fly River.

Pythia nov.sp.?—Fly River. Probably a new species, although I have a specimen similar to the two found by Mr. Froggatt, and also from the Fly River, labelled *Pythia undata*, Lesson. The present shell is imperforate and allied to *Pythia obscura* and *latidentata*, of Tapparone-Canefri (Fauna Malac. della Nuova Guinea, Suppl. I. p. 48-50, Pl. i. fig. 14-15 and 12), thus falling into the group B of T. Canefri, but it differs much from these as well as from *P. Wallacei* and *imperforata*, also recorded from Papua. It is a rather broad shell with a yellowish peristome and furnished with peculiar small denticles seeming to be constant between the larger ones on the palatal lamina.

* Mabile, in Bull. Soc. Malac. France, vi. Juin, 1889, p. 309-314, with Pl. VIII.

NOTE BY C. HEDLEY.—The paper in which Mr. Ancey described *H. granigera*, &c., was published by this Society, November 18, 1895; the date of Dr. Brancsik's paper I am unable to ascertain. Some of Mr. Froggatt's West Australian land shells have been already noted in the Proc. Malac. Society I. p. 259. In proposing a new subgenus for *Vivipara paulucciana*, I am inclined to think that my friend has overlooked the close affinity to *Larina* of Adams.

EXPLANATION OF PLATE.

Fig. 1.—*Sulcobasis leptocochlea*, n.sp.

Fig. 2.—*Trachia Froggatti*, n.sp.

Fig. 3.— „ *monogramma*, n.sp.

Fig. 4.— „ *orthocheila*, n.sp.

Figs. 5-6.—*Pupina Beddomei*, Anc. (see Proceedings 1895, p. 379).

Fig. 7.—*Chloritis Möllendorffi*, n.sp.

NEW MARINE SHELLS FROM THE SOLOMON ISLANDS AND AUSTRALIA.

BY JOHN BRAZIER, F.L.S., C.M.Z.S.

1. *VOLUTA KENYONIANA*, n.sp.

Shell ovately fusiform, thick, narrow; whorls 6, flattened; spire rather short; apex papillose, suture narrow, very much depressed and hollowed below, longitudinally somewhat obliquely ribbed with 19-20 obtuse ribs showing more prominently on the angle, side, base and the upper whorls; fulvous, reticulated and banded, fulvous-chestnut; aperture large; columella straight, with 4 plaits, the lower one long and narrow, second much thinner on the edge, thicker in the centre, third short and broad, fourth or upper more obtuse at the edge; peristome angulated, thickened in the middle, thinner at the posterior and anterior ends, interior of the aperture pale orange.

Length 137; breadth 46; alt. 37 mm.

Hab.—Cape Everard, Victoria (Coll. Mrs. Evans).

The specimen is in fine colour, but through rough knocking about on the beach where found a portion of the apex and a little of the upper and lower parts of the lip are broken off. The obtuse ribs remind one very much of such forms as *Voluta mitraciformis*, *lyraciformis*, *nucleus*, *deliciosa*, *Delessertiana*. But for size it might be taken for a ribbed form of *Volutella papillosa*, Swa. Mrs. Evans, through the kind mediation of Mrs. Kenyon, forwarded me the specimen for examination.

2. *VOLUTA ROSSITERI*, n.sp.

Shell ovately fusiform, thin, longitudinally finely striated; whorls 6, flattened, the three upper strongly ribbed, apex when

perfect papillose; spire short, strongly tuberculated at the angle; suture narrow, slightly crenulated, somewhat depressed below, yellowish-brown ornamented with longitudinal transverse opaque white and reddish-brown interrupted lines, showing more on the angle between the tubercles and below in the form of a band; aperture long and narrow; columella straight, with 4 very oblique plaits not very prominent, thin at the edge; peristome angulated (edge very much broken), interior of aperture pale orange-brown.

Length 108; breadth 37; alt. 30 mm.

Hab.—Gippsland Lakes Entrance, Victoria (Coll. Mrs. A. F. Kenyon).

This shell when in a good state of preservation must be a very beautiful one; the longitudinal and transverse opaque white and reddish-brown interrupted lines give it the appearance of being reticulated at the upper and lower parts, showing pale in the middle below the angle. The outer lip is very much broken, and a little off the apex is missing. I have named it after my kinsman, Mr. R. C. Rossiter, of New Caledonia, who made valuable collections at Corner Inlet, Port Fairy, Hobson's Bay, and other places in Victoria in the early part of the 'sixties.'

Gippsland Lakes Entrance is also the home of the fine *Voluta Roadknighti*, McCoy.

3. CONUS FLINDERSI, n.sp.

Shell elongated, solid, light mauve, spotted here and there with brown and opaque white, with a pale narrow white band, spirally rather deeply sulcated, much smoother in the centre, with longitudinal fine striæ; spire elevated, apex acute; whorls 9, coronated at the edge; suture moderately impressed, aperture narrow at the posterior end, wide at the anterior; peristome straight, interior of the aperture light brown.

Length 29; breadth 19 mm. Length of aperture 23 mm.; breadth of aperture 2, at base 3 mm.

Hab.—Flinders, Victoria (Mrs. A. F. Kenyon). Found under a stone at low water.

This species differs from anything previously found in southern waters.

4. *CONUS BARBARA*, n.sp.

Shell elongated, turbinated, subcylindrical, white, smooth, maculated with bluish-brown here and there, spirally ornamented with interrupted brown dots and opaque white lines; spire obtuse; whorls 8, suture narrow with three spiral deep grooves; base somewhat deeply grooved, between finely punctured; aperture very narrow at the posterior end, wide at the anterior; peristome slightly angulated, interior bluish-white.

Length 40; breadth 20 mm. Length of aperture 35; breadth $1\frac{1}{2}$ mm. Breadth of aperture at base 5 mm.

Hab.—Solomon Islands (Coll. Mrs. A. F. Kenyon).

This species is much shorter and narrower than, and differs in its markings and sculpture from, *C. achatinus*, Chem., which it very much resembles at first sight.

5. *CONUS FROSTIANA*, n.sp.

Shell smooth, solid, maculated with interrupted longitudinal brown and opaque white blotches; spire slightly elevated, apex obtuse; whorls 8-9, suture somewhat deep, with dark brown spots, and two small rather deep grooves below; base with 8 deep grooves and between numerous minute punctures; aperture narrow; peristome thin, edged with brown, interior white.

Length 18; breadth 10 mm. Length of aperture 15; breadth 1, at base 2 mm.

Hab.—Solomon Islands (Coll. Mrs. A. F. Kenyon).

A fine handsome little species allied to *C. monachus*, Linné.

6. *AXINÆA KENYONIANA*, n.sp.

Shell solid, triangularly ovate, angled and compressed anteriorly, ventricose, white, very beautifully painted with irregular, long, triangular, chestnut lines passing into descending rays towards the base, the umbones variously painted with zigzag lines and

blotches of the same colour; valves concentrically finely striated; umbones tumid, cardinal area short and deep; interior of the valves white, with a dark purple stain anteriorly; margins crenate.

Long. 42; alt. 38; diam. 22 mm.

Hab.—Entrance to the Gippsland Lakes, Victoria; found on the beach after heavy weather (Coll. Mrs. A. F. Kenyon).

This very pretty *Axinæa* is of a pure white, ornamented with elongated and zigzag chestnut lines, giving the appearance of a chain of mountain peaks seen at a distance. This is the *Axinæa* of Poli, 1791, *Pectunculus* of Lamarck, 1801.

ON SOME AUSTRALIAN *ELEOTRINÆ*.

PART 2.

BY J. DOUGLAS OGILBY.

At the last meeting of the session of 1896 I had the honour to communicate to the Society a paper on the above subject, which has, I am happy to say, met with cordial approval among the most advanced ichthyologists of the colonies and elsewhere, and I take this opportunity of thanking those friends whose kind and complimentary letters encourage me in the face of many and grave difficulties to proceed with the task of bringing Australian ichthyology more into line with modern thought. It is, therefore, with great pleasure that I now, just a year later, present to your notice a second paper dealing with other members of the same interesting subfamily.

In the former paper five species were described, namely:—*Carassiops longi*, *Kreftius australis*, *Mulgoa coxii*, *Ophiorrhinus grandiceps*, and *O. nudiceps*, while the present contains diagnoses of five others:—*Carassiops guentheri*, *C. galii*, *Kreftius adspersus*, *Eleotris fuscus*, and *Ophiorrhinus angustifrons*, two of which are described as new to science, while the fauna of New South Wales is enriched by no less than three.

Owing to the magnificent series of *Eleotris fuscus*, which has lately passed through my hands, thanks to the exertions of Mr. Charles Hedley, I am enabled to present to my readers a diagnosis of the restricted genus *Eleotris*, which has been made by some authors the refuge for so many and so varied forms that it is safe to say that in no other branch of biological science would such an extraordinary agglomeration of distinct forms been permitted for so long a time. A review of the family in accordance with

modern requirements, and in a publication which is likely to be accessible to all working ichthyologists, is a much needed desideratum.

The genus *Carassiops** may be amended and conveniently subdivided as follows:—

Snout scaly; dorsal spines six; caudal peduncle long and slender; vertebræ 25

CAULICHTHYS;† type *guentheri*.

Snout naked; dorsal spines six; caudal peduncle short and deep; vertebræ 25

CARASSIOPS;‡ type *compressus*.

Snout naked; dorsal spines seven or eight; caudal peduncle long and slender; vertebræ 30-31

AUSTROGOBIO; type *galii*.

Appended is a list of the species which appear to belong to this genus:—

CARASSIOPS.

1. *compressus*, Krefft, Proc. Zool. Soc. London, 1864, p. 184, Clarence River.
2. *brevirostris*, Steindachner, Sitzb. Ak. Wien, lvi. i. 1867, p. 314, Cape York.
3. *reticulatus*, Klunzinger, Sitzb. Ak. Wien, lxxx. i. 1880, p. 385, Port Darwin.
4. *elevatus*, Macleay, Proc. Linn. Soc. N.S. Wales, v. 1881, p. 622, Port Darwin.
5. *longi*, Ogilby, Proc. Linn. Soc. N.S. Wales, xxi. 1897, p. 733, George's River.
6. *cyanostigma*, Bleeker, Kokos, iv. p. 452, 1855, Kokos.

* *Carassiops*, Ogilby, Proc. Linn. Soc. N.S. Wales, xxi. 1897, p. 732.

† *καυλός*, a stalk or peduncle; *ἰχθύς*, a fish.

‡ *Auster*, south; *Gobio*, a genus of cyprinoid fishes, of which the European Gudgeon (*G. gobio*) is the type.

CAULICHTHYS.

7. *cyprinoides*, Cuvier & Valenciennes, Hist. Nat. Poiss. xii. p. 248, 1837, Bourbon.
8. *tæniopterus*, Bleeker, Bali, p. 298, 1849.
9. *leuciscus*, Bleeker, Sumatra ii. p. 278, 1853, Western Sumatra.
10. *guentheri*, Bleeker, Versl. en Med. xi. 1876.
11. *cyprinoides*, Klunzinger, Sitzb. Ak. Wien, lxxx. i. 1880, p. 384, Murray River.

AUSTROGOBIO.

12. *galii*, Ogilby, *antea*.

No less than eight of these species or supposed species belong to the Australian fauna, and I hope soon to be in a position to give a full description of the forms not hitherto noticed.

Subgenus CAULICHTHYS.

CARASSIOPS GUENTHERI.

- ? *Eleotris cyprinoides*, Cuvier & Valenciennes, Hist. Nat. Poiss. xii. p. 241, 1837, Bourbon; Klunzinger, Arch. f. Nat. 1872, p. 31 and Sitzb. Ak. Wien, lxxx. i. 1880, p. 384, pl. v. f. 2, Murray River.

Eleotris cyprinoides (not Cuvier & Valenciennes), Günther, Catal. Fish. iii. p. 118, 1862, Sumatra & Oualan; Macleay, Proc. Linn. Soc. N.S. Wales, ix. 1884, p. 33 (copied from Günther on the authority of Klunzinger's record).

Asterropteryx guentheri, Bleeker, Versl. en Med. xi. 1876.

Eleotris guentheri, Günther, Fisch. Sudsee, ii. p. 186, pl. xiii. f. A. 1876.

Black-banded Carp-Gudgeon.

D. vi, i 8. A. i 10. Sc. 26-28/8.

Depth of body $4\frac{1}{5}$ to $4\frac{2}{5}$, length of head 4 to $4\frac{1}{5}$ in the total length; width of head $1\frac{3}{4}$ to 2, of interorbital region 3 to $3\frac{1}{4}$,

diameter of eye $3\frac{2}{3}$ to 4 in the length of the head; snout short, its width between the posterior nostrils equal to or a little more than its length, which is as long as or a little shorter than the diameter of the eye. Maxillary not nearly extending to the vertical from the anterior border of the eye, its length from the tip of the snout $4\frac{1}{3}$ to $4\frac{1}{3}$ in that of the head. 12 or 13 gill-rakers on the lower branch of the anterior arch. The origin of the first dorsal is midway between the base of the last soft ray and the extremity of the snout or a little nearer to the former; the space between the origin of the second dorsal and the base of the caudal $1\frac{1}{4}$ to $1\frac{1}{3}$ in the remaining length; second dorsal higher than the spinous, its longest ray $1\frac{1}{4}$ to $1\frac{1}{2}$ in the head: ventral subequal to the head, the fourth ray produced, extending to or beyond the vent: pectoral with 13 or 14 rays, about as long as the ventral: caudal moderate, $3\frac{2}{3}$ to 4 in the total length; peduncle long, its depth $2\frac{1}{5}$ to $2\frac{3}{5}$ in its length, which is $\frac{1}{10}$ to $\frac{1}{3}$ longer than the head. Head-scales extending forwards on the inter-orbital region and snout; preorbital naked and somewhat swollen; breast-scales not much smaller than those of the body. Vertebrae 14 + 11.

Pale yellowish with a more or less conspicuous black band, one scale in width, extending from behind the upper half of the base of the pectoral to the base of the caudal, mostly below the median line; rarely this band is absent, while the scales composing it often have a lighter centre; usually all the scales above the band are dark-edged; interorbital region, snout, and a large blotch on the opercles bluish-black; mandibles and cheeks with dark dots; intermandibular region and lower lip dusky: dorsals violet, dotted with black, the second often with pearly spots posteriorly in the male.

E t y m o l o g y :—Named for Albert Günther, F.R.S., &c., the celebrated ichthyologist, keeper of the Zoological Department, British Museum, and author of many valuable works on natural science.

D i s t r i b u t i o n :—Fresh waters of Oualan, Fiji, Samoa, and New Caledonia. Not having a copy of his work, I cannot say whence Bleeker's types came.

As will be seen from the synonymy given above Bleeker has placed this fish in the genus *Asterropteryx*,* from which I have found it necessary to remove it to my genus *Carassiops*,† because in *Asterropteryx* (fide, Günther, Catal. iii. p. 132) the teeth are in a single series, and there is no genital papilla. The only differences between the group to which this species belongs and the typical *Carassiops* consist of the more depressed snout, the more elongated caudal peduncle, and the increased lepidosis of the head.

There can be no doubt that this is the species described by Günther (Catal. l.c.) as *Eleotris cyprinoides*, nor do I think that Bleeker's correctness in separating that species from the *E. cyprinoides* of the Histoire Naturelle can be called in question. There is, however, good reason for believing that Klunzinger's South Australian fish is distinct from both, since it differs not only in having a larger number of dorsal rays, but in the possession of no less than ten transverse series of scales between the origin of the second dorsal and the anal fins. This form might be separated as *klunzingeri*. It will, however, be necessary to make a critical comparison of all the species of *Carassiops* from different localities before these points can be definitely settled.

If Klunzinger's fish is not *Carassiops guentheri* the latter has at present no status in the Australasian fauna, but a glance at its recorded distribution will show that its ultimate inclusion within our limits is a mere matter of time; there can, therefore, be no objection to describing, and so inviting attention to it in this paper.

It is worth noting that in the New Caledonian examples the number of dorsal rays is constantly less than in those examined by Bleeker and Günther.

My largest specimen measures 90 millimeters.

* *Asterropteryx*, Rüppell, Atl. Fisch. Roth. Meer. p. 138, 1828 (*semipunctatus*).

† *Carassiops*, Ogilby, Proc. Linn. Soc. N.S. Wales, xxi. 1897, p. 732 (*compressus*).

Subgenus *AUSTROGOBIO*.*CARASSIOPS GALII*, sp.nov.

Gale's Carp-Gudgeon.

D. vii-viii, i 10-12. A. i 11-14. Sc. 29-30/8.

Depth of body $3\frac{3}{5}$ to 4, length of head $3\frac{3}{5}$ to $3\frac{4}{5}$ in the total length; depth of head $1\frac{1}{2}$ to $1\frac{2}{3}$, width of head $1\frac{1}{4}$ to $1\frac{7}{8}$, of the gently convex interorbital region 4 to $4\frac{3}{4}$, diameter of eye $3\frac{1}{5}$ to $3\frac{2}{5}$ in the length of the head; snout obtuse, $\frac{1}{5}$ to $\frac{3}{10}$ of a diameter shorter than the eye. Maxillary extending to or nearly to the vertical from the anterior border of the eye, its length $3\frac{2}{5}$ to $3\frac{4}{5}$ in that of the head. 7 gill-rakers on the lower branch of the anterior arch. The space between the origin of the first dorsal and the extremity of the snout is from $\frac{1}{7}$ more to $\frac{1}{4}$ less than its distance from the base of the last soft ray; the fifth and sixth spines are the longest, $1\frac{7}{8}$ to $2\frac{2}{3}$ in the length of the head and reaching to or beyond the origin of the second dorsal; the posterior soft rays are the longest, $1\frac{1}{5}$ to $1\frac{1}{2}$ in the head: the anal fin commences below the origin of and is similar to the second dorsal: fourth ventral ray the longest, $1\frac{3}{10}$ to $1\frac{3}{5}$ in the head and reaching to or not quite to the vent: pectoral with 15 rays, reaching to the vertical from the end of the first dorsal, $1\frac{1}{4}$ to $1\frac{2}{5}$ in the head: caudal rather short, $4\frac{1}{5}$ to $4\frac{3}{4}$ in the total length; caudal peduncle rather slender, its least depth $2\frac{2}{5}$ to $3\frac{1}{5}$ in its length, which is equal to or rather more than the head. Genital papilla oblong, extending to the anal or not so far. All the scales imbricate, those of the head, nape, and throat cycloid and smaller than the body scales, which are of equal size and ciliated. Vertebrae 30 or 31 (16+14-15).

Pale olive-green, more or less clouded above with purplish-brown: fins hyaline, the dorsals and anal with a broad coppery marginal band: irides silvery.

I am unable to give the true habitat of this species, which is only known to me from a stone tank in the Botanical Gardens,

where it was first discovered by my friend Mr. Albert Gale, who, believing it to be new, at once informed me, and together we visited the tank and, with the permission of the Director, succeeded in capturing a number of specimens. Nothing is known as to how the fish originally got into this particular tank, but doubtless the spawn was brought thither adhering to water plants of which several species, from various up-country localities, are growing in the tank. Mr. Gale, however, believes that he has caught the fish in the Turon River. It is a small form, my largest example being but 52 millimeters in length. The majority of those in Mr. Gale's aquarium are now breeding, many of the individuals which are distended with spawn being less than an inch in length, and so delicate that the large globular ova can be distinctly seen through the cuticle. The breeding season of *C. galii* is therefore different from that of *C. longi*, which spawns in the autumn. I have much pleasure in naming this species after its discoverer.

KREFFTIUS ADSPERSUS.

Electris adpersa, Castelnau, Proc. Linn. Soc. N.S. Wales, iii. 1878, p. 142, Fitzroy River.

Electris minimus, DeVis, Proc. Linn. Soc. N.S. Wales, ix. 1884, p. 690.

Purple-spotted Gudgeon.

D. viii, i 10-12. A. i 11-12. Sc. 32-33/11.

Depth of body 4 to $4\frac{1}{3}$, length of head $3\frac{1}{10}$ to $3\frac{2}{3}$ in the total length; width of head $1\frac{7}{10}$ to $1\frac{9}{7}$, of interorbital region $3\frac{1}{2}$ to 4, diameter of eye $4\frac{1}{3}$ to $4\frac{3}{4}$ in the length of the head; snout moderate and obtuse, its width between the posterior nostrils equal to or a little less than its length, which is $\frac{1}{3}$ to $\frac{1}{2}$ longer than the diameter of the eye. Maxillary extending to or slightly beyond the vertical from the anterior border of the eye, its length from the tip of the snout $2\frac{3}{5}$ to $2\frac{7}{8}$ in that of the head. 7 gill-rakers on the lower branch of the anterior arch. The space between the origin of the first dorsal and the base of the last soft ray is as long as or a

little shorter than its distance from the extremity of the snout, that between the origin of the second dorsal and the base of the caudal $1\frac{2}{5}$ in the remaining length; second dorsal higher than the spinous, its longest ray $1\frac{3}{5}$ to $1\frac{3}{4}$ in the head: ventral $1\frac{1}{2}$ to $1\frac{2}{3}$ in the head, extending to or nearly to the vent: pectoral with 15 rays, as long as or a little longer than the ventral: caudal moderate, $3\frac{1}{2}$ to $3\frac{3}{4}$ in the total length; peduncle short and deep, its depth $1\frac{2}{5}$ to $1\frac{4}{5}$ in its length, which is $1\frac{1}{3}$ in that of the head. Vertebrae 31 (14+17).

Reddish- or yellowish-brown, the upper surface suffused with purple; a series of large purple spots along the middle of the side, most prominent on the tail; sides of the head with three, sometimes four, oblique purplish bands: vertical fins violet-gray with patches of dusky dots, which on the anal are confined to the basal half and the posterior rays; ventrals and pectorals immaculate.

E t y m o l o g y :—*adpersus*, dotted.

D i s t r i b u t i o n :—Eastern Australia.

Castelnau's types came from the Fitzroy River and are probably in the Paris Museum, but there is a fine example in the University Museum from the neighbourhood of Stanthorpe, a town of Southern Queensland. In the same Museum is a specimen of *E. mimus*, without locality, sent, Mr. Masters believes, to Sir William Macleay by its describer, which has enabled me to compare the two forms and satisfy myself as to their identity, which indeed I had previously suggested (*Vol. xxi. p. 754*). I have also examined and dissected a mutilated example, which I found in a small collection of young fishes given to me by Mr. Lucas, the exact habitat of which is unknown to him, though he is sure that they came from this colony. Some years ago I received from Mr. A. G. Hamilton several fine gudgeons from creeks near Guntawang which belong, I am satisfied, to the same form; these are now in the collection of the Australian Museum. The species may, therefore, be looked upon as ranging from the Fitzroy River in the north to the Upper Shoalhaven District in the south.

The largest of the three examined measured 77 millimeters.

ELEOTRIS.

Eleotris, Bloch & Schneider, Syst. Ichth. p. 65, 1801.

Culius, Bleeker, Nederl. Ind. Nat. Tijdschr. xi. 1856.

Body stout, compressed posteriorly, the back broad and flat. Head large, wider than deep, depressed. Mouth large and oblique, the maxillary reaching beyond the front margin of the eye; lower jaw the longer. Jaws with a band of villiform teeth, the outer and inner series enlarged and conical. Nostrils widely separated, the anterior with a raised rim. Eyes supero-lateral. A concealed spine at the angle of the preopercle. Gill-openings rather narrow, scarcely extending to below the angle of the preopercle; six branchiostegals. Two dorsal fins, the first with six flexible spines, the second with i 8-12 rays; anal with i 7-12 rays, originating behind the second dorsal; ventral inserted behind the base of the pectoral with i 5 rays; pectoral subcuneiform, with 18 or more rays, the middle ones the longest; caudal rounded, the peduncle strong and deep. Genital papilla large, sexually dissimilar. Scales small, in 40 to 70 regular series, cycloid in front, ciliated behind; head except the snout and the anterior portion of the cheeks scaly. Vertebrae 25 or 26.

E t y m o l o g y:—ἤλεος, bewildered.

T y p e:—*Gobius pisonis*, Gmelin.

D i s t r i b u t i o n:—Tropical and subtropical parts of the Indian and Pacific Oceans, and of the Americas.

ELEOTRIS FUSCUS.

Pæcilia fusca, Bloch & Schneider, Syst. Ichth. p. 453, 1801.

Eleotris nigra, Quoy & Gaimard, Voy. Uranie, Zool. p. 259, pl. lx. f. 2, 1824.

Eleotris fusca, Günther, Catal. Fish. iii. p. 125, 1861, and Fisch. Sudsee, ii. p. 188, 1876, and Ann. & Mag. Nat. Hist. (3) xx. 1867, p. 62, and Voy. Challenger, Shore Fish. pp. 35, 58, 60, 1880; Macleay, Proc. Linn. Soc. N.S. Wales, v. 1881, p. 623.

D. vi, i 8. A. i 8. Sc. 62-68/17.

Depth of body $4\frac{2}{3}$ to 5, length of head $2\frac{7}{8}$ to $3\frac{1}{10}$ in the total length; width of head $1\frac{1}{4}$ to $1\frac{1}{3}$, of interorbital region $3\frac{1}{4}$ to $3\frac{3}{4}$, diameter of eye $4\frac{4}{5}$ to $5\frac{2}{3}$ in the length of the head; snout short and very obtuse, its width between the posterior nostrils subequal to its length, which is $\frac{2}{3}$ to $\frac{1}{2}$ longer than the eye. Maxillary extending to or not quite to the vertical from the middle of the eye, its length from the tip of the snout $2\frac{2}{3}$ to $2\frac{3}{4}$ in that of the head. 9 gill-rakers on the lower branch of the anterior arch. The space between the origin of the first dorsal and the base of the last soft ray is $1\frac{1}{4}$ to $1\frac{1}{3}$ in its distance from the extremity of the snout, that between the origin of the second dorsal and the base of the caudal $1\frac{1}{2}$ to $1\frac{2}{3}$ in the remaining length; soft dorsal higher than the spinous, its longest ray $1\frac{2}{3}$ to $1\frac{7}{8}$ in the head: ventral obtusely pointed, not quite extending to the vent, $1\frac{1}{2}$ to $1\frac{4}{5}$ in the head: pectoral with 17 to 19 rays, much longer than the ventral, $1\frac{1}{3}$ to $1\frac{1}{2}$ in the head: caudal large, $3\frac{2}{3}$ to $3\frac{3}{4}$ in the total length; depth of peduncle $1\frac{2}{3}$ to $1\frac{9}{10}$ in its length, which is $1\frac{1}{3}$ to $1\frac{1}{2}$ in that of the head. Vertebrae 11 + 14.

Back and sides dark olivaceous-brown or bluish-black, each of the scales sometimes with a darker central spot, forming together narrow bands; lower surfaces pale brown or bluish-white dotted with brown, the lighter colour sometimes extending in patches on the sides: fins hyaline, the dorsal and anal usually prettily marbled with black or brown, or with more or less regular series of blackish or brown spots; caudal with the basal third similar to the sides, which is sometimes preceded by a lighter band, the remainder pale brown or violet, with indistinct transverse bands; pectorals and ventrals with or without dusky spots or bands.

Etymology:—*fuscus*, brown.

Distribution:—From Madagascar through the seas of India and Australia to the Islands of the South Pacific (Solomon Islands; New Hebrides; New Caledonia; Sandwich, Fiji, Society, and Navigators Islands, Oualan).

I have never seen an Australian example, but a fine series collected by Hedley in New Caledonia has enabled me to draw up the above description.

OPHIORRHINUS ANGUSTIFRONS, sp. nov.

D. vii, i 10. A. i 10. Sc. 44/13 ca.

Depth of body $5\frac{3}{5}$, length of head $3\frac{1}{5}$ in the total length; width of head $2\frac{1}{5}$, of interorbital region 8, diameter of eye 4 in the length of the head; snout moderate and obtusely pointed, its width between the posterior nostrils less than its length, which is $\frac{1}{8}$ of a diameter longer than the eye. Maxillary extending to the vertical from the anterior border of the pupil, its length from the tip of the snout $2\frac{1}{3}$ in that of the head. 13 gill-rakers on the lower branch of the anterior arch. The space between the origin of the first dorsal and the base of the last soft ray is $1\frac{1}{5}$ in its distance from the extremity of the snout, that between the origin of the second dorsal and the base of the caudal $1\frac{1}{2}$ in the remaining length; soft dorsal higher than the spinous, its longest ray $1\frac{1}{2}$ in the head: ventral pointed, extending to the vent, $1\frac{1}{3}$ in the head: pectoral with 18 rays, subequal in length to the ventral: caudal moderate, $4\frac{1}{4}$ in the total length; depth of peduncle $2\frac{3}{5}$ in its length, which is $1\frac{1}{6}$ in that of the head. Occipital scales extending forwards to the interorbital region.

Pale yellowish-grey, the back and sides with irregular dusky blotches caused by the aggregation of minute brown dots; extremity of first dorsal dusky; second dorsal and caudal with irregular dusky bands.

Etymology:—*angustus*, narrow; *frons*, forehead: alluding to the narrowness of the interorbital region as compared with that of its congeners.

Type:—In my own collection.

Distribution:—Described from three small specimens taken in a net on Towree Point, Botany Bay, in pure salt water. The largest measured 60 millimeters.

Compared with an example of *Ophiorrhinus grandiceps* of the same size, the narrowness of the head and especially of the interorbital region is at once noticeable, as also is the greater concavity of the cephalic profile; also the ventral fins are elongate and filamentous even in the fry, while in the adult male of *O. grandiceps* they are short, even in the breeding season.

EXPLANATION OF PLATES XXIX.-XXXXIII. *bis*.

(See p. 720.)

Plate XXIX.

E. hæmastoma.

- Fig. 1.—Sucker leaf (*a*), mature leaf (*b*), bud and fruit of typical form (Sydney Coast District).
 Fig. 2.—Fruit (Berowra, Hawkesbury District).
 Fig. 3.—Bud and fruit (National Park, 20 miles S. of Sydney). Note the graduation in size of the above fruits.
 Fig. 4.—Nearly hemispherical fruit (Parramatta).
 Fig. 5.—Flat-topped, somewhat oblique, pear-shaped fruit (Peat's Ferry, Hawkesbury).

Plate XXX.

E. hæmastoma.

- Fig. 6.—Variety with fruits in a head; also a mature leaf, which much resembles the sucker foliage of the normal form (Mt. Victoria).

E. hæmastoma (micrantha).

- Fig. 7.—Sucker and mature foliage and fruits (Mittagong District; on ridges).

Plate XXXI.

E. hæmastoma (micrantha).

- Fig. 8.—Mature foliage and fruits (Mittagong District; on flats).
 Fig. 9.—Fruit (Mt. Victoria).
 Fig. 10.—Small mature leaf (Sydney District).
 Fig. 11.—Portion of an umbel, Cabbage Gum of the North Coast Districts. There are usually 8 or more fruits in an umbel.
 Fig. 12.—Tazza-shaped fruits from the South Coast.
 Fig. 13.—Umbel of fruits from Grenfell District, showing thin, long pedicels and flat-topped sharp-rimmed fruits. Sometimes there are 20 in a head.
 Fig. 14.—Mature leaf and umbel from Rylstone District.

E. stricta.

Fig. 15.—Mature leaf and fruit. Note the urceolate shape of the fruit (Mt. Victoria).

Fig. 16.—Fruit showing oblique shape (Mt. Victoria).

Fig. 17.—Leaf and fruit. The tips of the valves are flush with the top of the fruit (Lawson, Blue Mountains).

Fig. 18.—Fruit and leaf of var. *rigida* (Wentworth Falls).

Plate XXXII.

E. Luehmanniana.

Fig. 19.—(a) Sucker leaf.

Plate XXXIII.

E. Luehmanniana.

Fig. 19.—(b-c) Mature leaves of ordinary size. (d) Buds, showing flattened peduncle. (e) Fruit, showing corrugated surface, also the broad, flattened rim (National Park, near Sydney).

Plate XXXIII. bis.

E. Luehmanniana, var. *altior*.

Fig. 20.—(a) Mature leaf. (b) Pointed buds, with flattened peduncle. (c) Fruit, showing flattened, broad rim (from Mt. Wilson).

E. obusiflora.

Fig. 21.—(a) Sucker leaf. (b) Mature leaf. (c) Clavate buds. (d) Fruit (National Park).

Fig. 22.—(a) Mature leaf. (b) Bud, showing pointed operculum. (c) Fruit, slightly domed. This is the form (γ) from the Spit, Port Jackson, referred to in the text (p. 715) as a connecting link with *E. Luehmanniana*. Note the transverse veins starting out at a fairly uniform angle to the midrib.

Fig. 23.—Subcylindrical fruit.

Fig. 24.—Flat-topped fruit; in shape not unlike that of *E. stricta*, but with a thicker rim.

ON THE EVIDENCE (SO-CALLED) OF GLACIER ACTION ON MOUNT KOSCIUSKO PLATEAU.

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(Plates XXXVII.-XXXIX.)

[Read in abstract November 25th, 1896 (P.L.S.N.S.W. 1896,
p. 819); but publication deferred to allow of the author's again
visiting Mount Kosciusko.]

In January, 1885, Dr. R. von Lendenfeld made a visit to Mount Kosciusko. Shortly afterwards he issued a Report* dated 21st of January, 1885, and addressed to the Minister for Mines, in which he states that he found "rocks polished by Glacial Action"† in many places. Sometime afterwards he published a paper entitled "The Glacial Period in Australia."‡ Dr. Lendenfeld comes to the conclusion that Glaciers extended from a high Plateau, Mount Kosciusko—down into the valleys around; he noted that in these valleys "most beautiful and indubitable traces of glacial action";§ that evidences of Glaciation were "found in the shape of *Roches Moutonnées* scattered over an area of one hundred square miles."|| There can be no doubt Dr. Lendenfeld is referring to a Post-Tertiary Glaciation, for he adds, "that portion of Australia was, therefore, not so long ago, certainly covered with ice."¶ More recently Mr. Richard Helms accepted

* Report by Dr. R. von Lendenfeld on the results of his recent examination of the central part of the Australian Alps. Sydney. Thos. Richards, Government Printer. 1885.

† Dr. Lendenfeld's Report, p. 10.

‡ Proc. Linn. Soc. N.S.W. (1st Series), Vol. x. p. 48.

§ *Loc. cit.*, p. 47.

|| *Loc. cit.*, p. 50.

¶ *Loc. cit.*, p. 50.

these conclusions and contributed a paper* to this Society embodying some fresh observations. Mr. Helms concludes that there are "evidences of extensive glacier action at Mount Kosciusko," and that "many of the rounded, concave, and level surfaces found upon a number of the large rock facings have been produced by glacier action, although the minute features of it have long since been destroyed by erosion and decomposition."†

The present writer spent three weeks on the Kosciusko Plateau since the publication of the papers referred to. On my first trip I was accompanied by Mr. Charles Hedley, of the Australian Museum, and Mr. James Petrie, of the University. The route traversed is shown on the accompanying map. This record of the routes taken I consider of some importance, as the first essential for the forming of an opinion on the physical features of a locality is to actually go over the ground. I confess I went to Mount Kosciusko fully prepared to see the evidences of glaciation as observed by the authors referred to. Mr. Helms regrets "that time did not permit to make closer observations," and speaks of a lake "which like all the other features received only a passing glance."‡ I have no desire to dictate conditions to other writers, but when important conclusions are voluntarily placed on record, in the pages of a scientific publication, I think the authors should hardly plead want of time as an excuse for hasty observation. Dr. Lendenfeld certainly does not complain of want of time, but I am aware that he did not spend more than a few days on Mt. Kosciusko, so that his observations must have been of the nature of a general reconnaissance rather than a detailed examination. To guard against hasty conclusions, I undertook a second journey to Mt. Kosciusko, and, with the conditions of excellent weather and ample time, I made the observations embodied in this paper.

* Proc. Linn. Soc. N.S.W. (2nd Series), Vol. viii. p. 349.

† *Loc. cit.*, p. 352.

‡ *Loc. cit.*, p. 364.

Before dealing with my own observations, it is convenient to note that Dr. Lendenfeld found the strongest evidences of glaciation in the Wilkinson Valley. Now, Mr. Helms admits that wherever else he saw evidences of glaciation, he certainly saw none in the Wilkinson Valley, and just in the same way as Mr. Helms could see no evidence of glaciation, where Dr. Lendenfeld found such evidences to abound, I confess I have failed to see evidences of glaciation in any one of the localities indicated by Mr. Helms. Mr. Helms issued a map with his paper, on which map he coloured certain places (in blue) where what he terms "glacier traces" are specially pronounced. He also marks certain limited areas (in black) which he calls snow fields. From my standpoint these glacial traces have no existence, and as for the snow fields, I am able to say that on 20th January, 1896, there was not a square yard of snow on any part of the Kosciusko Plateau. I cannot, therefore, agree with Mr. Helms' opinion that "they never entirely disappear even in the hottest summers, and it may safely be said that they remain permanent over the limited area."

I leisurely examined every tract of country coloured blue on Mr. Helms' map; and, taking that map as a basis, I will deal with the so-called glacial traces, beginning with those immediately under Mt. Kosciusko. There is one thing to be noted about this map that has caused a good deal of confusion: Mr. Helms (following Dr. Lendenfeld) calls the highest peak Mount Townsend, and I have satisfied myself that he was not justified in so doing. To begin with, Dr. Lendenfeld ascended a mountain which *his guides told him was Mt. Kosciusko*.* He discovered another peak

* There was no other means of judging. No accurate maps were available at the time of Dr. Lendenfeld's visit. All that is really known is that Strzelecki named the highest peak, or what he took to be the highest peak, Mt. Kosciusko. Dr. Lendenfeld assumes too readily that Strzelecki did not ascend the highest point, although the distinguished Polish traveller had quite as many facilities for observation as had Dr. Lendenfeld. It must be remembered also that the two peaks, Mts. Townsend and Kosciusko, are within an easy walk of each other.

a mile to the south, which he found to be higher than the peak pointed out to him as Mt. Kosciusko. Thereupon he names this highest point Mt. Townsend. One of the residents of Monaro, Mr. John Barry, assured me that tourists were usually taken to a peak which he was well aware was not Mt. Kosciusko. Dr. Lendenfeld was misled in this way. When speaking of Mt. Kosciusko in this paper, it will be understood that I refer to the peak due south of Lake Albina, and called by Dr. Lendenfeld Mt. Townsend. There is another point about Mr. Helms' map. He speaks of various mountains on the Plateau as Mt. Etheridge, Mt. David, Mt. Tenison-Woods, Mt. Townsend, etc. This I think most undesirable. The whole mountain, as well as the highest point, should be called Mt. Kosciusko, and other eminences of note might be called peaks. It would be more satisfactory to speak of the Etheridge Peak, the David Peak, etc., and *Mount Kosciusko*.

Coming now to the evidences of glaciation, I first examined the valley of the Crackenback River. Dr. Lendenfeld is very definite in stating that "there was a small glacier at the head of the Crackenback."* Dr. Lendenfeld has not stated that he examined the country at the head of the Crackenback. I have reason to believe that he was never there. But as the statement is so very definite, I expected to find some evidence that the glacier once existed. In order to examine the country thoroughly, I left the beaten track and crossed over from Moonbar to the Mowambar or Moonbar River, and followed that stream by easy stages to its very source. I then crossed the divide to the head of the Crackenback. The rocks consisted entirely of granite in many varieties. No volcanic rocks or dyke rocks were observed. A portion of the valley was extensively turned over in times past by alluvial miners in search of gold. Around the old shafts the alluvial deposits may still be seen, consisting of boulders, shingle, and pebbles of granite, showing little or no signs of

* Proc. Linn. Soc. N.S.W. (1st Series), Vol. x. p 53.

decomposition. Nowhere in the valley of the Crackenback or at its head could I find any traces of grooved or scratched pebbles, or any features that would suggest *Roches Moutonnées*. Neither could I find any trace of Moraines. Very often masses of boulders might be noted, evidently transported from higher ground; but neither the boulders, nor the detrital masses of which they form a part, gave the least indication of glacial action. Undoubtedly, as Mr. Helms puts it, "rocks showing rounded, concave, and level surfaces"* are abundant. But most certainly none of these features can without strong collateral evidence be attributed to glacial action. From the Crackenback Valley I travelled along the main range to the foot of Mt. Kosciusko. Naturally I turned to the Wilkinson Valley for some of the evidence that Dr. Lendenfeld found so abundant. I camped here for a week, but long before that time elapsed I was forced to the conclusion that Dr. Lendenfeld was utterly mistaken in attributing any of the features in the Wilkinson Valley to glacial action. Thus far Mr. Helms agrees with me. Dr. Lendenfeld is very definite in his statement that he "found glacier-polished rocks in several places."† Mr. Helms could see none of these polished surfaces in the Wilkinson Valley. Let me add that I could see none of them either. In despair at finding any of the traces that were so evident to Dr. Lendenfeld, I decided to visit other places indicated on Mr. Helms' map as affording the "glacier traces." This map appears as Pl. xviii. in Proceedings of this Society (2nd Series), Vol. viii. Map in hand I journeyed to Lake Albina, on which lake Mr. Helms shows a peninsula jutting into the lake, and he colours this peninsula blue, as affording evidence of "glacier traces." Here is a photograph showing the lake and the peninsula. (Pl. xxxvii., fig. 1). In the picture there is nothing to be seen suggestive of ice action. On examining the place itself there is absolutely nothing to be found indicative of ice-action. There is in fact no feature about the lake, the cliff, or the talus at its base, that may

* Proc. Linn. Soc. N.S.W. (2nd Series), Vol. viii. p. 352.

† Proc. Linn. Soc. N.S.W. (1st Series), Vol. x. p. 47.

not be amply accounted for by forces actually in operation. Indeed, the more closely I examined the talus at the base of the cliff beyond the lake, the more astonishing it seemed that any feature observable could, in the most distant way, suggest ice action. Indeed, I will go further and say that if the evidences in favour of glaciation on every point of the Plateau were overwhelming, if we could point to grooves, furrows, scratches, moraine deposits, and boulder masses, and if we had an abundance of *Roches Moutonnées*, I would still make exception of the shores of Lake Albina, and conclude that there, at any rate, no traces of glacial action were in evidence, and nothing suggestive of ice action was preserved. I lingered a day longer in this locality in the hope that any evidence however slight might be forthcoming in favour of the position taken up by Dr. Lendenfeld and Mr. Helms. Nothing more was discovered, and, therefore, I place it on record that in my opinion there is nothing to the eye of the geologist indicative of ice action on the shores of Lake Albina. Turning again to Mr. Helms' map we find that there are tracts coloured blue, in a line directly under Lake Albina; in other words, in a direct line south-east of the lake. To prevent any confusion, it may be noted that one of these blue patches covers the word "dividing," and the other is situated on the Snowy River, between its source and the junction of its first affluent on the right bank. I took special pains to locate these two areas, and in fact examined every square yard of the ground. Once again I was forced to conclude that Mr. Helms has misinterpreted the facts observable; I could not find anything whatever of his "glacier traces." There is abundance of what Mr. Helms calls rock débris. "We could observe," remarks Mr. Helms, "extensive flats with large rocks sticking out of the surface here and there, and bogs all over them"; but I am utterly unable to see what grounds there are for Mr. Helms' conclusion that "these flats have been formed by ice."* Three miles to the south of the Perisher, as shown in Mr. Helms' map, two other areas may be noted, coloured blue, as

* Proc. Linn. Soc. N.S.W. (2nd Series), Vol. viii. p. 353.

showing glacier traces. There is some difficulty in determining the exact position of these areas, as the map is not quite accurate here in the contour of the hills. I am not prepared to state absolutely that I found the identical place referred to by Mr. Helms, and on that account I cannot be too positive. I cannot believe, however, that I did not actually traverse the ground, the locality not being far from the main track, but nothing at all suggestive of ice action caught my eye. As Mr. Helms does not refer particularly or definitely to these two places, I pushed on and formed a camp at Pretty Point, so as to be centrally situated in the most extensive glaciated areas shown on Mr. Helms' map. Mr. Helms is very definite in his conclusion concerning this locality, and speaks about an open grassy flat at Wilson's Valley. This valley he says "may safely be considered attributable to glacier action."* A few lines further on he says, "entering the flat we stand on Boggy Plain and upon an unmistakable glacier deposit." This I consider the most astonishing statement in Mr. Helms' paper. The assertion simply bewilders one. I cannot conceive how such a conclusion could have been reached: to my mind this one fact is abundantly, unmistakably clear—Boggy Plain is not a "glacier deposit." There is nothing that one can appeal to, nothing that one can point to, indicative of ice action. "Proceeding," says Mr. Helms, "the evidence of ice action is becoming more plentiful at almost every turn." I have to state simply that I saw nothing of the sort. This was not attributable to any want of care or observation on my part. I went to the Kosciusko Plateau believing that evidences of glaciation were abundant, and it was with the utmost reluctance that I was forced to come to the conclusions here recorded.

The value of Mr. Helms' observations could be tested critically on Boggy Plain. Nowhere is he so definite in his statements as when speaking of Boggy Plain. I decided on this account to examine the plain thoroughly, and nothing could be easier than

such an examination. The season was a fairly dry one, and a number of shafts had been sunk some years ago, during a particularly dry season, at various points on the plain in search of gold. These shafts were put down in exactly the way a geologist would like to have them, namely, in the "deepest ground," as it was the miners' desire to get through the drifts on to bed rock, in their search for gold. I was agreeably surprised to find in these shafts boulders of pure quartz, quartz-porphry, and diorite, the two last-named rocks being for the most part perfectly sound, and showing very little signs of decomposition. I exhibit some of the boulders collected by me. They are just of the right material and in the proper state of preservation to show any traces of grooving or scratching—if grooved or scratched they ever had been. Take this boulder of diorite, for instance, the very finest scratches would be preserved here, had they ever been made. I examined hundreds of stones of this sort out of the shafts from positions where a geologist would have selected them, had the shafts been sunk for his own particular use, but never once did I find a grooved boulder, or striated pebble, or a polished surface. The stones in these shafts are not angular, but, on the contrary, well water-worn and rounded. Mr. Helms points out that polished surfaces are not to be expected, nor grooves nor striæ to be looked for on the gneissic granite and slate rocks, as he observes "they would not retain polish or striation for any length of time." Indeed, Mr. Helms' paper would lead one to believe that slate and gneissic granite were the only rocks on the plateau. I would point out that there is basalt a short distance from the top of Mt. Kosciusko. There is basalt also a little to the north of Mt. Townsend. There is a picrite-basalt at Lake Merewether, and quartz-porphry and diorites must be abundant from the quantities of boulders of these rocks found in the shafts. Let me insist on the fact that *all* the boulders in the shafts on Boggy Plain are water-worn; even the blocks of quartz are rounded. If these water-worn stones are the work of a glacier, I can only say that every alluvial gold-field in New South Wales is rich in "glacial traces"—a somewhat absurd, but necessary conclusion.

Abandoning all hope of here finding support for Dr. Lendenfeld's "Glacial Period in Australia," I turned to the valley named on Mr. Helms' map Glacier Valley. There is little to be gained by describing this valley and its rocks in detail. Nothing that I saw altered the opinion already expressed. Rounded rocks there are, and smoothed rocks also, with contours that probably *could* be produced by ice, but on a critical examination even that probability vanishes.

There remains but one other tract on Mr. Helms' map to deal with. This is the area around Lake Merewether, named Evidence Valley, I presume on the "lucus a non lucendo" principle. There are many features in this tract that may require or suppose the existence of ice-sheets and snow-fields, and the violent action of heavy streams of water flowing under ice; but there is nothing to warrant one's supposing the existence in the past of *moving* ice.

Some of the individuals of the large rock masses in this valley are strikingly angular. A photograph (Pl. xxxviii., fig. 2) will show the actual breaking up of granite into rectangular blocks by natural weathering. Many of these blocks are as rectangular as if hand-dressed from a quarry. The vast piles of blocks, many of them of this description, between the Hedley Tarn and the Snowy River, are a somewhat exceptional occurrence. I should not, however, feel justified in supposing *moving* ice to have brought these massive rocks together. Other collateral evidence ought to be forthcoming of the existence of glaciers. I mean by collateral evidence, such evidence as is afforded by scratches, grooves, and furrows on rocks, boulder clays, angular blocks, *Roches Moutonnées*, perched blocks, transported blocks, moraines and moraine deposits.

In accounting for the origin of masses of boulders in such a region as that we are dealing with, it may be well to bear in mind that the forces of disintegration and decomposition are far more intense in their action here than under normal conditions. We should remember, too, that we are dealing with possibly one of the oldest land surfaces on the globe. The destruction by weathering, including in that term disintegration and decomposi-

tion, must be enormous on mountain peaks like Mt. Kosciusko. Many of the great packs of loose rock material have no doubt been formed by selective process, the smaller stones being carried away where heavier masses remain. I have noticed immense blocks undoubtedly carried a short way down some valleys—blocks which one could hardly suppose were carried by running water. I can see no reason, however, for assuming that ice was the transporting agent. By a continuous undermining (by running water) of the softer materials on which they rested, they could easily have been moved into their present positions.

Some of the granite rocks to the south and west of Lake Merewether have a decidedly rounded and smoothed appearance, but not more pronounced, I should say, than that familiar to every geologist in the granite districts of New England and even in the neighbourhood of Bathurst and Cowra.

I repeat that it may be necessary to assume the existence of thick sheets of ice to explain some of the features noted, and we may even utilise valleys filled with snow, over the frozen surfaces of which boulders may have slid; but assuredly there is no feature in Evidence Valley that requires moving ice to explain it.

Dr. Lendenfeld and Mr. Helms have assumed throughout that there is above their supposed glaciers a gathering ground where snow could accumulate and consolidate into ice, and so form a feeding ground for the glaciers. A few hundred yards from the great glacier, supposed by Mr. Helms to have come down from Mt. Twynam, we have the very summit of a sharp divide, with a rapid fall away on the other side. We have, in fact, a glacier without a gathering ground, a condition of things not easy to understand. Dr. Lendenfeld in like manner fills the Wilkinson Valley with a glacier. The learned doctor from his experience very well knew that a glacier must have a gathering ground. Following up the Wilkinson Valley from the point where Dr. Lendenfeld makes his glacier do most of its work we come, in about half a mile, to the summit of the divide, from which point another valley dips away on the opposite side. It is reasonable to ask: where were the snow-fields and the gathering ground for the glacier of the Wilkinson Valley? Dr. Lendenfeld replies by

assuming their existence, and from my standpoint as a geologist I protest against this assumption on his part. Take Dr. Lendenfeld's plate of the Wilkinson Glacier (Proc. Linn. Soc. N.S.W. Vol. x. Pl. 7), sketched from Mt. Townsend (our Mt. Kosciusko). It will be noted that away to the back of the range, showing as he says polished rocks "en face," he makes mountains rise tier above tier. Pl. xxxvii., fig. 2, is a photograph taken from approximately the same spot that Dr. Lendenfeld sketched from. It will be noted that there are no mountains rising above or beyond the range across the valley, and more than that I assert that standing on the very highest point of Kosciusko (Mt. Townsend of Lendenfeld) and looking in the direction in which the Doctor sketched, no mountains or table-lands are visible above the range across the valley. In other words, the view is bounded in that direction by the outline of the range, round the base of which Dr. Lendenfeld asserts the glacier wound. The long stretches of great mountains that appear on Dr. Lendenfeld's plate as showing above the Abbott Range, when seen from Mt. Townsend (our Kosciusko), do not exist. In a word, a serious difficulty in the case of the supposed Wilkinson glacier, and the supposed Helms glacier described as coming over Townsend, is that these glaciers have no place to come from. It may be argued that the plateau, which must be postulated in each case, has disappeared by being denuded away. Possibly, but if these great mountains and plateaux have been planed down, since the "glacial period," there is little hope for the polished rocks of Dr. Lendenfeld, or the rounded rocks of Mr. Helms, being preserved. Either supposition is fatal to the position taken up by Dr. Lendenfeld and Mr. Helms.

Before concluding I may say that, at several points on the plateau, I found polished or rather smoothed faces on rocks. In every instance this was due to slickenside. On the end of a ridge that bounds the valley of the stream that flows from the Garrard Tarn I noted a surface of several square yards of *polished* rock. The rock was a micaceous slate, and I was somewhat puzzled to account for the polish on so soft a rock. Besides, the polished surface stood

nearly vertical. This of course *could* be caused by moving ice, by supposing the valley to be filled with a glacier. On examining the specimens by slicing them for the microscope, I found that the polish was due to a thin coating of silica. Now a glacier may smooth a rock and polish it, but certainly not coat it with silica. The explanation is that the point at which I collected my specimen is close to the boundary of an intrusive granite. The slate is much faulted, broken, and contorted, and the specimen referred to is part of a slickenside formed at the time of the intrusion of the granite.

So far I have not alluded to the evidences of glacial action in recent times that have been described as occurring to the South of Mt. Kosciusko and for the most part within Victorian borders. Many of the descriptions published are circumstantial in every way and cannot be lightly put aside. As I have not been over the ground I cannot offer any criticisms from my own knowledge. It seems to me, however, that in most of the instances quoted the characters referred to glacial action could have been as well attributed to other causes. In a word, if overwhelming evidence was forthcoming as to the glaciers described by Dr. Lendenfeld having existed in fact, then features that could have been produced in another way might safely be attributed to glacial action. The instances cited seem to me something in the nature of collateral evidence depending entirely for its value on the *fact* of a glacial period. Mr. R. M. Johnston* has summarised the papers referred to in a manner which leaves no doubt of the great weight of evidence that has gradually accumulated in favour of recent glacial action. I refer to this evidence merely to point out that it cannot be ignored, and to emphasize the fact that this paper deals only with Mt. Kosciusko and the country immediately round: a tract that may be defined as embraced in the map published herewith as well as that published by Mr. R. Helms.†

My conclusions may be summed up as follows:—I have been over the same ground as Dr. Lendenfeld and Mr. Helms. I

* Papers and Proceedings of the Royal Soc. of Tasmania for 1893, p. 73.

† Proc. Linn. Soc. of N.S.W. (2nd Series), Vol. viii. p. 349.

could not but agree with Mr. Helms as to the absence of any evidence of glaciation such as Dr. Lendenfeld had reported in Wilkinson Valley. But I also feel compelled to differ from Mr. Helms in respect of the other localities in which he believed he had detected evidence of "glacier action," as indicated on the map accompanying his paper; and I am forced to the conclusion that the evidence adduced is wholly insufficient, and that no striæ, groovings or polished faces (due to ice-action), or *roches moutonnées* perched blocks, moraine-stuff, or erratics are to be met with. Only one example of anything like a polished block was noted, and in this case the polishing and striæ-like markings were clearly due to a "slickenside." Most of the granite is of a gneissic character, but normal granites are also present, the latter weathering into spheroidal masses of disintegration, the contours of which in a few cases are suggestive of ice action. There is no collateral evidence to support any such suggestion. It has been stated that the rocks on the plateau are not such as would preserve glacial striæ. This is not strictly in keeping with fact, as I found porphyries, diorites and basalts, as well as abundance of quartz pebbles and boulders in the drifts. Apart from local evidence, the general contour of the valleys is not in the least suggestive of glaciers. I therefore concluded that (1) there is no satisfactory evidence of glaciers having once filled the present valleys; (2) there is absolutely no evidence of extensive glaciation on the Kosciusko Plateau; (3) The glacial epoch of Australia in Post-Tertiary times, as described by Dr. Lendenfeld, has no foundation in fact. Neither are there any snow-fields with "eternal snow," however limited, on Mt. Kosciusko.

POSTSCRIPT.—After this paper was written a paper embodying an extended series of observations on evidences of glacial action on the Australian Alps across the Victorian border was read to the Sydney Meeting of the Australasian Association for the Advancement of Science by Messrs. Kitson and Thom. It seems to the present writer that the case made out by these authors in favour of recent glacial action in the Australian Alps is no stronger than that of Dr. Lendenfeld and Mr. R. Helms.

EXPLANATION OF PLATES.

Plate XXXVII.

Fig. 1.—Lake Albina (Mt. Kosciusko in the distance to the left). This picture is taken from a ridge North from Mt. Kosciusko, and the peninsula jutting into the lake is, that distinctly marked on Mr. R. Helms' map as preserving "glacial traces." All the country shown here is above the tree-line. The gully, seen in the distance, forming a feeder to the lake, marks the exact line of junction between slate and granite country. The hills to the right are slate; Mt. Kosciusko itself and the country to the left of the gully are granite varying from typical to gneissose granite.

Fig. 2.—This photograph is taken approximately from the western shoulder of Mt. Kosciusko, and from approximately the same point as that from which Dr. Lendenfeld made his sketch shown in Vol. x., Plate 8, of the Proceedings of this Society. Mueller's Peak (Mt. Townsend) is seen in the distance to the right. Looking in the same direction from which this photograph was taken no ridges are visible above the horizon shown. This may be said even of a view taken from the very summit of Mt. Kosciusko. The country shown is all above the tree-line.

Plate XXXVIII.

Fig. 1.—The Garrard Tarn. There is no tarn or lake in Kosciusko that affords direct evidence of ice-action. The tarn shown is, in the author's opinion, a dammed up elbow of an ancient stream; but immediately in the background a cirque or corrie may be seen in course of formation which will in time form an independent tarn or add to the area of the tarn figured.

Fig. 2.—A little to the N.E. of Lake Merewether, granite may be seen breaking up into the angular blocks shown. The sheeted structure of much of the granite on the plateau lends itself to the production of vast masses of detrital matter in which the granite boulders show parallel and plane faces. When this sheeted granite is traversed by joints, weathering gives rise to large quantities of angular blocks.

Plate XXXIX.

The Kosciusko Plateau showing the author's route and all the known lakes and tarns.

NOTES AND EXHIBITS.

[N.B.—The October and November Notes and Exhibits have inadvertently been transposed.]

Mr. Brazier, on behalf of Mrs. Kenyon, exhibited specimens of the following Mollusca (Fam. *Veneridae*) found on the Victorian coasts, and contributed a Note on the same:—*Venus gallinula*, Lam., *V. australis*, Sowb., *V. scalarina*, Lam., *V. Peronii*, Lam., *V. aphrodina*, Lam., *V. spurca*, Sowb., and *Tapes flammiculata*, Lam., originally described under *Venus*.

Mr. Brazier exhibited, and contributed a Note descriptive of, a new Volute from the Lakes Entrance, Victoria. The only specimen available at present is unfortunately somewhat broken.

Mr. A. H. Lucas exhibited examples of extreme fasciation in the Flannel Flower (*Actinotus helianthi*) and *Calycotrix tetragona*; also specimens of *Casuarina glauca* infested with *Eriococcus turgipes*, Maskell (determined by Mr. Froggatt). Wherever the parasite had attached itself the shoot had made a simple bend round it, growth of the shoot being hindered on the side next the scale. This arrangement gives a simple means of covering and protection to the parasite. A whole avenue of the *Casuarina* was so affected.

Mr. Froggatt exhibited a number of scale insects (*Eriococcus coriaceus*, Mask.), upon a twig of Eucalyptus, among which had been placed a great number of the eggs of the scale-eating moth *Thalpochares coccophaga*, Meyr. The eggs are pale pink, circular, and beautifully ribbed. The scales were infested with the larvæ of *Cryptolæmus montrouzieri*, Muls., one of the useful small black ladybird beetles. Both these enemies of *Eriococcus* are of great economic value, as the moth larvæ have now taken to eating the olive scale (*Lecanium oleæ*, Sign.); and the ladybird beetle is systematically bred both in New Zealand and America. Also living specimens of the largest Australian white ant, *Calotermes longiceps*, Froggatt, which were taken out of a log of fire-wood, and had already been in captivity for over two months.

Mr. W. Forsyth, on behalf of Mr. Maiden, exhibited flowering specimens of three rare plants, *Phebalium elatius*, Benth., from the Mongani Mountain, District of Gloucester, N.S.W.; *Pterosphaera Fitzgeraldi*, F.v.M., from the Blue Mountains, and *Myoporum floribundum*, A. Cunn., from the Nepean River.

Mr. Ogilby exhibited the specimen of *Trachypterus* described in his paper.

Mr. Fletcher showed a series of Tasmanian and West Australian frogs in illustration of his paper.

WEDNESDAY, MARCH 30TH, 1898.

The Twenty-fourth Annual General Meeting of the Society was held in the Linnean Hall, Ithaca Road, Elizabeth Bay, on Wednesday evening, March 30th, 1898.

Professor J. T. Wilson, M.B., Ch.M., President, in the Chair.

The Minutes of the previous Annual General Meeting were read and confirmed.

The President then delivered the Annual Address.

PRESIDENTIAL ADDRESS.

In reviewing the work of the past Session, it is satisfactory to be able to report that it has been a decidedly busy one. The full number of Meetings was held, the number of papers read being forty-nine. The majority of these are contained in the three Parts of the Proceedings for 1897 which have been published and distributed. The balance of the papers are already in type, so that the concluding Part is well advanced.

Nine Ordinary Members were elected into the Society during the year; one Member resigned on his departure from Australia; and the Roll has been further depleted by the demise of one Ordinary and one Corresponding Member.

Mr Robert Cooper Walker, late Principal Librarian of the Sydney Public Library, who died on July 25th, 1897, in his 65th year, was one of the Society's Original Members who kept up his membership to the last. He was the son of the late Rev. James Walker, M.A., Oxon., some time Head Master of the King's School, Parramatta. Mr. Walker was born in England, but came to the Colony while still young. He entered the public service in 1855; and in 1869 he was appointed to the position of

Principal Librarian of the Public Library, which he held until his retirement on a pension in 1893. The Public Library developed very considerably during Mr. Walker's lengthy administration. One branch of it especially commanded his attention, namely, the literature relating to Australasia. As a result, and with the co-operation of the Trustees, the Sydney Public Library now possesses a very fine collection of publications and documents of this character; and in 1893, under Mr. Walker's editorship, a bulky quarto bibliography relating to the same was published. Mr. Walker was not directly interested in the special pursuits which it is the primary object of this Society to foster. His membership, as in the case of many of the Original Members, was to some extent rather the expression of his sympathetic recognition of the claims of a Scientific Society for support on the broad general grounds of education and culture.

No doubt the Society was most in need of support in the critical period of its very early history. The number of those in a position to contribute papers, and the amount of work done, have since then been steadily on the increase. But, taking into account the general increase in the population and the considerable development of the Colony since 1875, the Council cannot but regret that there has been a falling off in the membership, especially in that section of it of which Mr. Walker was a representative.

Professor Thomas Jeffery Parker, D.Sc., F.R.S., who died on November 7th, 1897, at the early age of 47, was elected a Corresponding Member in 1893. He was the eldest son of the late William Kitchen Parker, F.R.S., the well-known comparative osteologist and morphologist, and was alike eminent as teacher and as investigator. Until his appointment to Otago in 1880, Professor Parker for a number of years was Professor Huxley's Demonstrator at the School of Mines, and there he materially assisted his distinguished colleague in developing the biological portion of the curriculum along the lines which made it as a biological course second to none in the United Kingdom. In "Nature" of January 6th, 1898, will be found a most interest-

ing and appreciative sketch of Jeffery Parker's life and work, written by his old friend, colleague and successor, Professor G. B. Howes, F.R.S. It is so difficult for one possessed of less personal knowledge to speak effectively on a subject of this kind after a deliverance by one who has spoken with full personal knowledge, that it were wise not to attempt to supplement what Professor Howes has so admirably and so sympathetically given us. I may content myself, therefore, with commending to your perusal the article to which I have referred.

It is fitting, also, that some reference should be made to two other well-known members of the community who passed away in July last, within a few days of each other and of Mr. Walker. Sir Patrick Jennings, K.C.M.G., who died on July 11th, aged 66 years, was an Original Member of the Society who maintained his membership until quite recently. He was well known by his lengthy political career, by his association with the cause of higher education as a member of the Senate of the University, and by his great interest in art and music, and in public affairs generally.

The Venerable Archdeacon R. L. King, B.A., Cantab., who died on July 24th, 1897, aged 74, though never a Member of this Society, actively co-operated with Sir William Macleay in carrying on the work of the Entomological Society of New South Wales, to which he contributed a number of papers, and of which for two years he was President. Mr. King was the eldest son of the late Admiral King, so well known in the annals of Australian maritime exploration. During his residence in Parramatta as Incumbent of St. John's Church, and for some little time after his removal to Liverpool as Principal of the Moore Theological College, Mr. King took up the study of natural history as a hobby, and for a busy man he succeeded in accomplishing a surprising amount of entomological and other zoological work, until the pressure of official duties and want of leisure obliged him to give it up altogether. With the exception of several papers on Entomostraca contributed to the Royal Society of Tasmania, and published in the Papers and Proceedings

for 1852-54, all Mr. King's papers will be found in the two volumes of Transactions of the Entomological Society of N. S. Wales.

In December last our respected Hon. Treasurer, the Hon. Dr. Norton, communicated to the Council his wish to be relieved of the responsibilities of office, finding it desirable in the interests of health to forego some of the official duties with which in his leisure he has long voluntarily occupied himself. In accepting Dr. Norton's resignation, the Council unanimously resolved that there should be entered on the official records a minute expressive of the Council's regret at his retirement, and of its appreciation of the valuable services which Dr. Norton had cheerfully rendered to the Society without intermission since January, 1882.

Under the new rules now in force, the appointment of the Hon. Treasurer rests with the Council. I am glad to be able to report that, on the nomination of his predecessor, Mr. P. N. Trebeck, whose business qualifications are of a high order, was elected to and has kindly consented to fill the vacancy which under the gradual unfolding of the plans of the founder of the Society is not now the sinecure it used to be when the Society's finances were on a more humble scale.

An important achievement of last Session was the revision and extension of the Society's Rules. The Council had learnt by experience that some such step in this direction was to be desired. Early in the year a Committee was appointed to consider and report on the whole question. The efforts of the Committee—and in this connection special mention must be made of the valuable assistance rendered by Mr. J. R. Garland—resulted in a draft which was submitted to the Council, and after full consideration and with a few amendments adopted. It was subsequently submitted at a Special General Meeting of the Members in November last, and finally passed without further amendment. Copies of these amended Rules, which are now in force, were issued to Members with the Part of the Proceedings last distributed.

Another important matter which has been settled is the appointment of the first Macleay Bacteriologist. Towards the

close of the year the Council again took the matter in hand. Applications for the position were invited by advertisement in Britain and in the Colonies. In response nine candidates offered themselves. The applications were referred to the advisory sub-committee to which matters relating to this appointment have throughout been referred, and a selection of two candidates was made. One of these gentlemen was finally appointed by the Council at a Special Meeting on the 4th inst. The successful candidate is Mr. R. Greig Smith, B.Sc. Edin., M.Sc. Durh., F.C.S., who has for some time filled the position of Lecturer in Agricultural Chemistry at the Durham College of Science, Newcastle-upon-Tyne. Mr. Smith comes to us highly recommended from home, and he has had some continental experience in the laboratories of Prof. Stutzer, of Bonn, and of Herr Alfred Jörgensen, of Copenhagen, as well as the opportunity of acquiring some knowledge of the manufacture of tuberculin as carried out on a large scale in the laboratory of Professor Bang, of Copenhagen.

Whether the candidate finally selected should be a Bacteriologist with a pathological bias, or one with a physiologico-chemical, a purely biological, or an industrial bias, were questions which obviously could hardly escape notice and consideration. As matters turned out these questions were settled by circumstances rather than by the direct intervention of the Council. The essential thing is that the Macleay Bacteriologist should be engaged in doing good work. The encyclopædic Presidential Address of Prof. Marshall Ward in the Botanical Section at the recent Meeting of the British Association for the Advancement of Science in Toronto makes it abundantly evident that, over and above purely pathological developments, the operations of bacteria in a thousand ways affect us in matters relating to our daily life, our homes, our food and drink, our domestic animals and our industries. So that here, not less than in the field of infectious diseases, there is ample scope for the investigations of the Bacteriologist who is working only with scientific ends in view.

In this connection, though not a matter directly concerning this Society, it is a matter for congratulation to note the recent appointment of Dr. F. Tidswell, lately Demonstrator in Physiology in the University of Sydney in succession to Dr. Martin, as Bacteriologist to, and the establishment of a Biological and Bacteriological Laboratory in connection with, the Board of Health. This important new departure, taken in conjunction with the appointment of the Macleay Bacteriologist, betokens a noteworthy improvement in the prospects of scientific Bacteriology in this colony.

Passing now from the consideration of the Society's more private concerns, I propose to touch upon one or two outside matters of interest. In October last some of us had the pleasure of boarding the s.s. John Williams to welcome back Professor and Mrs. David and some of the members of the party which visited the island of Funafuti last year for the purpose of putting down a bore in the coral reef. At the time of Professor David's departure from the island, the boring had reached a depth of 557 feet without getting through the reef. Later on Mr. Sweet arrived with the rest of the party, bringing the news that a depth of 698 feet had been finally reached, but without touching bed-rock. We have had the pleasure of hearing from Professor David a general account of his visit; and in a recent number of the Proceedings of the Royal Society of London (Vol. lxii. p. 200, Dec. 1897), will be found his Preliminary Report on the results of the expedition; so that I need not enter into further details. But I cannot allow this occasion to pass without doing what, I feel sure the Society will look to me to do, namely, to tender to Professor David and his coadjutors not only the hearty congratulations of this Society on the success which has attended their enthusiastic labours, but also our earnest wishes for complete success in any further efforts which he may be able to make towards settling this important question.

In the early part of January of this year the Australasian Association for the Advancement of Science held its seventh Meeting in this city. As you already know, the Meeting in the

opinion of those best qualified to judge was by no means the least successful and enjoyable of the series. Representative visitors from the other colonies were strongly in evidence, and the opportunities for comparing notes, for exchanging ideas, for talking over questions of correlation and problems of intercolonial and general interest, and for the promotion of good fellowship generally, were freely taken advantage of. The proceedings of Section D., Biology, were somewhat clouded by the lamented death of Professor Jeffery Parker, D.Sc., F.R.S., President elect. Professor C. J. Martin at short notice kindly agreed to fill the breach, and both by his interesting Address, and by his genial and efficient exercise of the functions of Chairman, contributed in a high degree to the success which attended the meetings and deliberations of the Section. On this occasion, for various reasons, the botanists were more strongly and actively represented than the zoologists. They showed their wisdom, too, in having on hand for discussion knotty and perplexing problems of general interest, such as the Classification of the Eucalypts, which can be dealt with to most advantage at the meetings of the Federal Parliament of Science, for then naturalists from widely separated districts in the different Colonies can unburden themselves of their local knowledge, and so contribute to the consideration of difficult questions on broad and comprehensive lines. Zoologists and botanists alike will perhaps be glad to hear that at the next meeting of the Association in Melbourne Professor Spencer hopes in a similar manner to arrange for some special papers leading up to the discussion of biological problems of other than merely local and colonial interest. In no direction perhaps can Section D accomplish better and more useful work.

I trust I may be pardoned for singling out for special remark certain papers which have during the year been published in England, not only since these have been the work of Members of this Society at present absent from Australia but because their subject matter is to a great extent of a very specially Australian interest. I refer to papers by Dr. Robert Broom on the Morphology of Jacobson's Organ in the Mammalia; by Dr. Elliot

Smith upon the fornix cerebri and the margin of the cerebral cortex, on the origin of the corpus callosum and other neurological subjects; and finally by Mr. J. P. Hill, whose luminous paper on the placenta of *Perameles* will, I am convinced, remain as a classic record of a discovery of the highest biological import.

Not only is the subject matter of these papers largely drawn from Australian sources, but in each case the papers now referred to may be regarded as containing further records of investigations some of whose preliminary results were formerly communicated to this Society and are embodied in its Proceedings.

Lastly, but of the very first importance, there is to be noted the welcome addition to our libraries of a new Text-book of Zoology, in 2 vols., the joint work of two Australasian biologists. We deeply deplore the fact that the production of this great work should have constituted the final episode in the splendid life-work of Professor Jeffery Parker, to whom, together with his distinguished collaborateur, Professor Haswell, F.R.S., a predecessor in this chair, we owe this magnificent compendium of Zoological learning. The book is, I believe, unique in plan and conception. Its unsurpassed wealth of illustration reflects credit alike on authors and publishers, and, along with the pre-eminent excellence of its plan of exposition, must commend it to a place as an educational aid and a general work of reference, hitherto unoccupied, so far as I know, by any other treatise.

I am confident that you all join me in heartily congratulating Professor Haswell on the completion of this great undertaking, as well as upon the recognition by the Royal Society of London of his own acknowledged reputation as a scientific investigator, in his election during last year as a Fellow of that august body.

On glancing around for a subject which I might most suitably take as the leading subject of my address this evening, I early realised that the situation was, for me, by no means an easy one. It so happens that the matters which of late have chiefly occupied my attention are for the most part of such specialised character that the interest they possess for the general biologist is necessarily slight. On the other hand, I have to regret that my own

acquaintance with systematic natural history—the aspect of biology which on the whole most directly concerns my fellow-members—is a very narrow one. In view of my positive disqualification from this point of view, I cannot help feeling that my acceptance of the honourable office to which you were good enough last year to call me has placed me in a position which, if not wholly false, is at least somewhat misleading.

I am not in a position to review the recent work in any large division of biological science; nor am I prepared with a contribution towards the advancement of knowledge in any important subdivision of biological inquiry.

How, then, can I best attempt to reveal the intellectual sympathy which yet undoubtedly underlies the relation between us as members of this Society—a sympathy which serves to unite persons of such diverse interests as geologists, physiologists, botanists and entomologists in the common bond of a kindred spirit? Need I do more on an occasion like this than ask you to call to mind the name under which as a Society we are enrolled? For, to the whole civilised world of to-day, the name of the illustrious Swedish Naturalist stands for that of fellowship in that true Nature-worship which consists in lifelong devotion to any one of her manifold aspects, and of which our Society is at once a means and an expression.

The interpretation of the phenomena of life and organisation in some detailed province is what each of us is attempting from day to day, and in his own way, to realise. Yet perhaps it is as well that we should occasionally detach ourselves from the engrossing and fascinating details of our special work, and ask ourselves—not as scientific specialists, but as biologists in a wider sense—what these familiar yet mysterious phenomena of life may imply.

However much the necessities of specialisation may separate us in the everyday aspects of our work, here, at least, we shall be upon common ground. And should such an undertaking require apology, it is that my own qualifications to be the exponent of such topics are so meagre. Yet even this imperfect

attempt may be of service in anew directing your own thoughts upon subjects which cannot entirely or for long be kept in the background.

In order to bring under our consideration some of the governing ideas of modern biology, it is well and even necessary to look backwards toward the earlier stages of their growth.

For our present purpose, it is unnecessary to attempt a complete historical retrospect.

From the scientific awakening which characterised the period of the Renaissance up to the early part of the eighteenth century the progress of natural science had been steady and assured.

But when we attempt to realise the state of biological thought in what may be called the Linnean period of the eighteenth century it is necessary to have regard to the conditions imposed upon it by the state of knowledge in other departments, and by the restrictions of a very limited technique of investigation.

It is difficult fully to realise the aspect which the problems of biology presented to men for whom nearly the whole of modern chemistry, and so much of the methods and results of experimental physics, were still non-existent. Microscopy, too, though practised, it is true, as early as the previous century, had made little progress; and though it had been the means of revealing a number of additional structural facts, it cannot be said to have taken rank as a reliable or habitual instrument of research. Of the minute structural characters of living tissue, hardly anything at all was known, whilst the processes and reactions of which these tissues are at once the seat and the essential mechanism were likewise wrapped in the profoundest obscurity. And if these internal relationships of organism were little understood, the interpretation of the external relationship subsisting between organism and organism both in structure and in function was likewise profoundly limited and restricted by the current conceptions of the relations between past and present in the world's history.

The Copernican revolution in astronomy has been rightly regarded as a symbol and an expression of a far more general

change, which affected man's entire attitude towards the problems presented by his own being and by the world around him.

The gradual but momentous change in point of view which thus set in revealed itself in many directions, but preeminently in the impetus given to methods of naturalistic interpretation of phenomena.

Closely associated with this tendency was another which made for an "emancipation of our ideas of the past from their bondage to the present" in the interpretation of sequences of events in time. This we may describe as the dawn of the scientific historical method, whose fuller development and wider application to the most varied phenomena has borne such remarkable fruit during the present century.

It was not, indeed, within the domain of the natural sciences, strictly so-called, that the first indications of the development of this method may be clearly perceived. Rather it took form as applied in explanation of the successive aspects of philosophic thought in the eighteenth century. Yet evolutionary science is its flower or fruit; and if this cannot safely be said to have arisen primarily as a biological speculation, it is nevertheless the greatest achievement of modern biology to have provided a detailed demonstration of some of its leading factors and modes of operation in one great sphere of cosmic phenomena.

A brief consideration of the state of biological opinion in the time of Linnaeus may serve to make the subsequent progress clearer. Linnaeus himself was far from being a highly speculative biologist. Preeminently an observer and recorder of facts, his monumental system of classification was admirably adapted to the necessities of his generation. Although substantially a morphological system, based upon facts of structure, the Linnaean classification was artificial as regards its criteria. Still, for Linnaeus himself, those more or less arbitrary structural criteria were only the earmarks, as it were, of a true and actual relationship of the different plants and animals to each other. Such a relationship was conceived by him as indicative of community of origin in the beginning of things in the creative

thought of the Maker of the universe. It was not regarded by Linnaeus as an expression of morphological identity of origin by the genuine and natural blood-relationship of descent.

For a considerable period, indeed, Linnaeus maintained the doctrine of the absolute fixity of species. Each species was a final form, a finished product, direct from the hands of the Creator. Yet in later life his views on this question underwent a slight modification. He seems to have held that it was in the genus of to-day that we have to recognise primitive species, and that the differentiation which subsequently ensued was due to hybridisation with other species, thus generating new, but in a sense degenerate, specific forms.

On the whole the views of Linnaeus represent the conservative and non-speculative tendencies of his age. On the other hand, his enormous industry served to accumulate vast stores of those materials which were the essential condition of subsequent progress in scientific hypothesis.

If we wish to gain an insight into the more speculative tendencies of the time of Linnaeus we must turn to his great French contemporary Buffon. The history of the growth and development of the evolution doctrine well illustrates the play of the conflicting tendencies represented by these two distinguished Naturalists. Starting from a similar point of view to that of Linnaeus, Buffon's brilliant imagination enabled him far to transcend the current modes of thought, and in a sense to anticipate several of the future determining ideas of biological science. Not only did he come to doubt the fixity of organic groups, but he anticipated the theory of the action of environment and even dimly the Darwinian doctrine of natural selection itself.

Fertile and suggestive of future advance as his imagination was, Buffon cannot be said to have himself effected any substantial or immediate change in the scientific opinion of his own day. Still the inspiration of his novel and suggestive ideas for some of his successors was a great and lasting one, more particularly and directly upon his younger friend, Lamarck, and also upon Geoffroy St. Hilaire.

When the infallibility of the dogma of fixity of species had been seriously questioned by men like Linnaeus and Buffon, the first and very momentous step had been taken in the direction of the modern standpoint. From this time forth transformist ideas never lacked adherents, though the issue of the conflict with the conservative doctrine of fixity was, owing largely to the later overwhelming influence of Cuvier, for long to remain doubtful. Meanwhile the problem for the transformists became even more complicated. For, supposing it to be granted that structural modification of organic forms has actually occurred, the question then arises: "How, and by what agencies, are we to suppose that this transformation has been effected?" In other words, what are the factors in the hypothetical process of evolution?

In attempting to answer this question the cardinal biological fact of adaptation between organism and its environment stood forth as above demanding recognition and explanation.

How could this harmony or unity be imagined to have been attained and preserved alongside of, and perhaps in spite of, disturbing modifying influences? Two possible answers obviously presented themselves from the naturalistic point of view. Either the direct operation of environment has determined structural change and variation in a passive and plastic organism in the direction of harmony with itself; or, on the other hand, the initiative must in some sense have come from within the organism. The latter must then be conceived as an active agent which, under the pressure of an internal "organic necessity," adapts itself, though in reaction to environment, by actual if slight structural alterations. Further, such acquired changes, the results of constant habitual and useful adaptation to a changed or changing environment, are permanently embodied and handed on to the offspring by inheritance.

The pre-Darwinian evolutionists may be ranked as adherents of the one or other of these explanatory hypotheses. The elder St. Hilaire may represent those who, with Buffon himself, chose the first alternative, whilst the name of Lamarck is now inseparably linked with the second.

It will be observed that in both of these hypotheses thus presented there is presupposed the principle of continuity or uniformity in Nature, which indeed lies at the root of every application of the historical method of interpretation. The negative attitude assumed by Cuvier, the great founder of palæontology, towards the entire theory of mutability is, of course, to be correlated with his advocacy of periodic extinction of types and of catastrophic geological hypotheses generally.

The uniformitarian principle was most strongly upheld by Lamarck, and, though for a time it was relegated to the background by the great authority of Cuvier, it once more, and finally, reasserted itself convincingly in Lyell's *Principles of Geology* in 1830. From the triumph of uniformitarianism the reassertion of the somewhat discredited evolutionary principle was almost a necessary consequence. Yet Lyell himself was a professed agnostic as to the natural causes determining the successive appearance of new forms; and none of the immediate evolutionist precursors of Darwin were able to add anything new to the discussion of the probable factors and conditions of the process they were disposed to advocate.

The part played by the Darwinian conception of natural selection in gaining for the evolution doctrine a practically universal acceptance in the thought of this century, is too familiar to allow of my pressing it on your attention at any length.

It provided, for would-be evolutionists, that basis of natural causation in organic transformation, the absence of which from the earlier evolutionary theories explains their inability to rise above the almost purely speculative stage. Thus, if we take such speculative evolutionism in perhaps its most striking literary expression, we may recognise in the pregnant thought of Goethe a strong and confident conviction of a unity of type and of a "shaping principle which works underground in Nature." For him these were patent and operative principles, and proofs of actual community of origin amongst organic forms. Yet his suggestive biological ideas were unable to reach the condition of acknowledged scientific certainty in the absence of such a theory

of a *modus operandi* in the way of natural causation as is for us supplied by the selection theory.

That theory is indeed the answer to Kant's demand for a "mechanism of Nature" which should "give us an insight into the generation" of organic forms, and should confirm his supposition that these "have an actual blood-relationship, due to derivation from a common parent." That natural selection has justified its claim to be considered as just such a "mechanism of Nature"—as a determining factor in evolution—few if any will now deny. Whether or not, on the other hand, it is an all-sufficient explanation of the appearance of new structural features, and thus of new organic forms, or whether the Lamarckian factor of use-inheritance also plays the part of an integral factor in the process, is even now the subject of most energetic controversy. Into the details of that controversy I do not propose to enter. I would only point out that if the latter factor be admitted to equal rights with the former, the problem of the mode of natural operation, or the mechanism, whereby the effects of use are registered and expressed in definite and transmissible structural alteration, still remains unsolved. But after all this question is not quite a fundamental one. Whether on strictly selectionist principles alone, or with the admission also of use-inheritance, the factor of variation is implied and assumed. Whether, as the selectionist holds, variation is indefinite, and occurs indifferently in all possible directions, or whether, with the Lamarckian, we admit that variation is frequently in a definite and determinate direction, there is yet an element in the chain of natural causation which is fully explained on neither supposition.

It is true that emphasis may be laid, as by Mr. Spencer, and as earlier by St. Hilaire, on the determining effect of environment. But it is next to impossible to prove—and certainly it has not been proved—that simply of itself environment can do anything at all. We can never fully eliminate or distinguish what is due to the reaction of the organism to the environing conditions. Organism is never passive. The distinguishing feature of life consists in activity in the way of adaptation, whether we view it

in its internal relations as process in the individual organism, or in the external relations of organism to its outer environment. And if we take refuge, as in the meantime we may still permissibly follow Darwin in doing, in the idea of a "spontaneous variability" of organism, this is of course to confess that we are still unable to penetrate far enough into the ultimate mechanism, if we conceive it as such, which underlies the admitted process of organic modification.

Professor Weismann, it is true, attempts wholly to eliminate the action of environment in the *production* of variations, while assigning to it the exclusive privilege of perpetuating the lucky ones by its selective influence. But it will, I think, be found difficult to do justice to the admitted influence of environment upon the ordinary phenomena of the life of organisms and, as even Weismann admits, upon their somatic structural constituents, and yet jealously and rigidly to exclude these operations from any modifying influence whatsoever upon the germinal constituents. And when even this is actually attempted the resulting effort to account by germ structure for the spontaneous production of the infinite variety necessary for a selection theory, introduces yet another complication into the operations of that tremendous mechanical apparatus of the germplasm, which has been conjured up in explanation of the facts of hereditary transmission. Still the mere fact that complication of this kind is the result constitutes in itself no valid objection to the theory. But, in the last resort, the expedient merely shifts the difficulty of a solution from one sphere to another; and the dexterous compression of the problem so as to enable it to be hidden out of sight in the ultra-microscopical structure of the chromatin of the germ-cell, even if legitimate, can hardly in the meantime be said to make for simplification.

Concerning the details of the argument between Weismann and his critics I shall say nothing. The general verdict amongst biologists in the meantime would appear to be that its results are so far inconclusive. But I may point out that Weismann's contribution to the general theory of evolution may be regarded as

a strictly logical continuation of that effort to account for the phenomena of life on the lines of physical causation which the introduction of the conception of natural selection seemed to bring within our reach. In other words, its object is, like that of every purely naturalistic theory, to explain away the teleological phenomenon of adaptation which had appeared to the older biologists to be, *prima facie*, the cardinal characteristic of all organic process. It aims at replacing the idea of purpose or final cause by the purely physical idea of determination by efficient cause as the ordinary and necessary procedure of all scientific interpretation.

This mechanical tendency in the treatment of the relations of the organism to the external world and to other organisms, in space and time, is not its only expression in modern biological thought. On the physiological side also, dealing with life as manifested in the inner relations of the parts and organs of the body to one another, the same spirit has been active.

The vitalistic interpretations and theories which were current earlier in the century have been subjected to a progressive destructive criticism, and it has been claimed that the more insight we get into the true character of living process, the more clearly does it appear that their natural explanation must come to us in terms of physics and chemistry if at all. And there are abundant proofs that the application of physico-chemical ideas and methods to the investigation of vital phenomena is able to carry us further in the direction of an intelligible explanation of living processes than could formerly have been dreamed of.

Whatever may be the final explanation forced upon us of the real nature of the operation of living activity in an animal organism, it is beyond doubt that our acquaintance with the manner of that operation has grown enormously along with the assumption of its essential identity with inorganic process.

Yet in spite of this there have been many indications during the latter part of this century of a reaction away from mechanical and back towards vitalistic interpretation.

It has been contended that, notwithstanding the seeming ease with which many of the phenomena of life can be translated into the language of physics and chemistry, we find whenever we push the analysis of function far enough, that eventually we are simply brought back again to the original problem with which our analysis started, in the ultimate dependence of all bodily process upon the life of the individual component cells of the organism.

Our progress—and after all it is progress—has consisted in pursuing the secret of living activity somewhat deeper into the recesses of organisation. And just when we seem to have eliminated something of the mystery of living process, we find that we have only succeeded in storming the outworks, and that the citadel of the vitalistic position yet lies securely intrenched behind the defences of the living cell.

In other words, the essential problem of physiology has merely been transferred from the cell complex, which forms the body or the bodily organ, to the more remote individual organism or cell, which for us in the meantime forms the unit alike of structure and function.

Even more than this may be claimed by the advocate of vitalism. For the interactions, correlations and co-ordinations subsisting between the component cells and parts of an organism, as in the case of a developing embryo, have not hitherto shown themselves amenable to a mechanical interpretation.

On the other hand, it may be said that recent experimental work on the mechanical conditions of developmental processes is making satisfactory progress in this very direction. And even if we admit that in no case has the progress of physiological investigation enabled us actually to reduce living process to terms of chemistry and physics, this need not blind us to the wonderful and significant advance which the effort to do so has procured. It is not too much to say that every year further facts of organisation and additional events in life-processes are having assigned to them their physical and chemical conditions, and are thus so

far being reduced to the position of elements in the cosmos viewed as a mechanically determined material system.

There seems no reasonable ground for believing that the continued application of the same instruments and principles of research, of the same naturalistic conceptions, which has already yielded such magnificent fruit in the proximate interpretation of function and structure, will henceforth become more and more barren. In the struggle after scientific progress what other weapons have we to rely upon? It is significant that, even amongst those who steadfastly deny the sufficiency of chemico-physical interpretations of living process, are to be numbered investigators who have themselves been forward in the application of the most rigidly exact methods of weight, measurement and analysis, in the study of vital phenomena. They have thus done homage to the methods in which the mechanical principle is already in a sense implied, admitting its applicability to certain aspects at least of the phenomena to be investigated.

Is there then any justification for the contention of the "vitalist" of this latest era in physiology? Is there any point at which the principles of physical and experimental inquiry fail in applicability; any aspect of living activity which they are incapable of embodying?

It is claimed, as we have seen, that physiological investigation has not succeeded in eliminating the idea of purpose from the last interpretation of any biological fact of structure and function which has been offered for analysis.

That science will ever enable us to say that at last we have a perfect, self-consistent and complete mechanical explanation of even the simplest fact of living process or tissue seems to me to be in the highest degree improbable.

The brilliant physiological analysis of the mode of working of the bodily organs which is one of the characteristic products of the biological activity of the century has indeed by no means ceased. But though still proceeding in manifold and specialised directions, it is hampered at almost every turn by the difficulties attaching to an explanation of the living activity of the cell unit.

And if, to-morrow, this obstacle be partly surmounted—as is likely enough—by further discoveries in the way of intracellular mechanisms than the important ones already made, yet we may be very sure that in every forthcoming interpretation the notion of adaptation or purpose will again re-assert itself, though for a time it may be concealed under the disguise of a mere unexplained residuum which refuses to be read into the next current mechanical hypothesis.

Does it not appear to be the doom of Biology to be for ever endeavouring to reduce such an unexplained residuum? It must never despair of its ability to translate the facts into the language of physical causation. Thus only does it fulfil its mission as a branch of Natural Science which is “to distinguish the threads of necessity that bind together the most disparate phenomena” even though in so doing it may seem to be “explaining away all life and unity in the world and putting everywhere mechanism for organism even in the organic itself.”

But we are by no means compelled to assume that the method of explanation thus pursued represents the only mode of apprehension of the facts, the only possible interpretation of their meaning. It is indeed vain to look to Science for the recognition of an aspect of living phenomena which it must of its own inner necessity ignore. On the other hand, “there is little ground,” said Prof. Burdon Sanderson in 1889, “for the apprehension that exists in the minds of some that the habit of scrutinising the mechanism of life tends to make men regard what can be so learned as the only kind of knowledge. The tendency is now certainly in the other direction. What we have to guard against is the mixing of two methods, and, so far as we are concerned, the intrusion into our subject of philosophical speculation. Let us willingly and with our hearts do homage to ‘divine philosophy,’ but let that homage be rendered outside the limits of our science.”

It is just such an intrusion of the fruits of a distinctively philosophical interpretation of organisms into the domain of strictly scientific speculation that tends to vitiate the modern

"vitalistic" views. I am willing to admit that the vitalistic recognition of purpose does, in a sense, more justice to the facts of organism than a method which ignores purpose. But I do not think the idea of purpose helps us at all in strictly scientific and experimental procedure, and its attempted scientific application is simply an attempt to "find a gap in that circle of mechanical motions" which alone constitutes the cosmos for experimental science.

In science properly so called, "the phantoms of life, the final causes" which (as Mr. Caird says in this exact connection) "distort the prose of science" must be resolutely put from us, even though, with them, all hope of finality and unity in the ultimate explanation of the world, from the point of view of physical science, completely disappears.

In a genuinely scientific explanation there is never reached a stage at which we can forsake the mechanical method simply because we can no longer recognise, nor easily imagine, the nature of the unknown antecedents of a phenomenon. Vitalistic or teleological interpretation is not a method which comes to our rescue when a physical interpretation fails us. In so far as it is valid at all, it is one which is present with us and which urges itself upon us *at every stage*, forbidding us ever to mistake a possible mechanical interconnection of the phenomena of life for the real ground in thought of purposive adaptation. This idea indeed intrudes itself upon our apprehension as the special characteristic of the organic world at any and every stage of scientific development, but it is not a product of the *scientific* imagination. Any apparent force which latter-day vitalistic objections to the mechanistic procedure of science may possess would seem to depend upon the mixing up of two possible modes of explanation. The endeavour is made, by pointing to the incompetence of the mechanical method to explain certain aspects of living process, to make room within the circle of scientific experience itself for a mode of explanation which has neither relevance nor validity in the sphere of experimental science.

It is doubtless true enough, as the vitalist maintains, that it is insufficient as an explanation of living process merely "to trace energy from the surroundings through the organism and out to the surroundings again. If," he continues, "this is to be taken to be a full account of the process it is inadequate, for it ignores the fact, characteristic of life, that the energy spent by the organism on its surroundings is not dissipated at random on those surroundings, but is so directed as to cause them to give back again to the organism, sooner or later, just as much energy as the organism has previously expended. In other words, the distinguishing feature of vital activity is self-preservation or the conservation of the organism in a state of functional activity."

The criticism is just, and appropriate enough. But from the strictly scientific point of view the fact that there is not an indefinite, but a definite distribution of energy simply suggests a further search for a mechanism to account for this additional fact of distribution along lines which, as a matter of fact, make for self-preservation. It will not do to say that such a mechanism is inconceivable. It was just such a problem with which Science was confronted during the growth of the theory of Evolution. How was the obvious adaptation of evolving organism to environment to be accounted for on the lines of Natural Causation? The answer to this was the theory of Natural Selection.

And just in so far as the Natural Selection theory eliminates the idea of purpose (contained in adaptation between organism and environment) from the notion of Evolution, so far also—and no further—might a possible extension of mechanical hypothesis enable us to dispense with the idea of final cause suggested by the purposive distribution of bodily energy above referred to.

It will not do to harbour the notion that the current of energy, of which the organism is conceived as the physiological channel, can be either interfered with, or even determined in its direction by, purposive conditions. So to represent it is found to involve the vain attempt "to get at an end or final cause without leaving the point of view of efficient causality." And, just as determinism is within its rights in abolishing the abstract self

"which claims an empirical freedom of will amid the strife of motives," and as it is impossible "to save for this self even the power of directing attention on one motive rather than another," so, whenever the organism is regarded as a vehicle of energy, it is vain to aim at vindicating the idea of final cause by claiming for it any empirical power of determining the distribution of that energy for ends or purposes.

In the same able essay from which I have quoted the reference to purposive distribution of energy, allusion is made to the well-known phenomena manifested in the regeneration of the amputated limb of a newt. After summarising the process by which the bud of embryonic tissue goes on to re-form all the tissues of the lost limb, bone, muscle, nerve, &c., the writer proceeds:—"Every cell performs its appropriate duty until the whole business is accurately finished without fail. Is it conceivable that each of the thousands of separately existing cells concerned in the process should have a mechanism within it which would cause it in spite of all obstacles to take up the position and undergo the modification requisite for the proper performance of its work in the newly developed hand? Or is it conceivable that mechanical pressure of any kind should cause the bud to grow into a perfect hand? The alternative hypothesis is that each cell is determined directly in its action simply by what it has to do in order that the vital activity of the newt may be restored to its normal condition."

Now to my mind it is not only not impossible but it is almost imperative that we should conceive just such mechanical arrangements as are here assumed to be out of the question. Without such presupposed mechanism no conception of detailed sequences of events could be formed and the entire natural process would have to be regarded as physically unintelligible. But some definite chain of physical events in such a case there *must* be; and each event must have its physical antecedents and conditions which must almost necessarily be embodied in some sort of structural mechanism. What that mechanism is is of course precisely the kind of question which it is the function of Natural

Science to ask and her chief business to answer. To the question whether in such a case an answer can even be conceived it ought to be sufficient to reply that of recent years it has been the object of Weismann's elaborate theory of the architecture of the germ plasma to furnish just such an answer. Whether the effort is well or ill-directed to that object it is beside the question to enquire. If not that solution then another, not less mechanical, may be forthcoming.

We may therefore pay little heed to those who would bid us cast away the hope that the closer investigation of cell structure and function may enable us to read even these into the convenient if more abstract terms of mechanism. It does not follow that the mechanism itself will be found to be simple. The nucleus of an ovum, so long as we can say little or nothing of its structure, seems an object of no great complexity. But if we are to make any progress at all on naturalistic lines, the future advance of biological investigation must consist in unravelling the enormous structural complexity with which we are bound to credit it. And as an attempt in this direction even the demand made on the mechanical imagination by Weismann's stupendous germ plasma may be regarded as not greatly excessive. Such an hypothesis as Nägeli's micellar theory too might likewise open up a most fruitful field of discovery.

It appears to me most probable that ere long we shall arrive at ideas with regard to the architecture, not only of the germplasma, but of the cell as a whole on the lines of some such conceptions as are involved in theories like those of Weismann and Nägeli.

Nor need we pay great heed to the warnings we sometimes hear respecting the bounds to further structural investigation imposed by unavoidable optical limitations, as in the construction of lenses.

It may be true that by-and-bye we shall reach such optical limits. But the implied assumption is hardly warranted, that only by optical means and methods can we possibly in future gain an insight into what we now term the ultra-microscopical structure of living tissue. It is surely quite amongst the

practical possibilities of future science that the arrangement in space of the material particles of protoplasm supposed, for example, by such an hypothesis as Nägeli's, may be sufficiently attested and verified by other than optical means; it might even be by the incidence on appropriate instruments of other than optical radiations. Who can tell what structural facts may not be borne witness to by future instruments of research?

It seems reasonable to believe that no limit can be assigned to the efforts of science to supply an answer to all questions relating to the "how" of phenomena—to the manner of their being and becoming, past and present.

As to their "why,"—their object, purpose or final cause,—that is sometimes declared to be a matter of which we are not only ignorant, but of which we cannot even hope ever to know anything at all. And if what I have already said be true, then it follows that upon such questions Science in the narrower sense must be for ever dumb. We must be content to recognise that its operations are conducted entirely on the plane of a mechanical interpretation of phenomena even when its subject matter consists of organised material and living process.

What place, then, can be assigned to the notion of purpose or final cause in a scheme of human knowledge? Is there any sense in which its validity in the interpretation of the world must be acknowledged? Thus stated, the question need no longer excite the suspicion with which any claim on the part of teleology to strictly scientific validity must be viewed.

It cannot be denied that the adaptation of objects and processes to ends or purposes is plainly and unmistakably suggested to the ordinary human intelligence. It is true that this suggestion is not obviously pressed upon us by a consideration of the facts of the inorganic world. But whenever we enter the domain of organism we find, even in the lowliest expression of living activity, that we can no longer ignore the purposive character of that activity. We seem to have entered upon the exploration of a kingdom of ends, wherein all events that occur suggest not merely, or even chiefly, a dependence upon preceding events, but

a dependence upon events which have not yet occurred. In other words, organisms appear to perform acts in order that more or less definite results may be brought about; and the nature of the living acts is therefore determined not merely by what has gone before, but by what is yet to follow. "It is that which is about to be that guides the growing thing and gives it unity."

It is this adaptation of means to ends which is put in the forefront in all teleological interpretation. And a very little consideration is sufficient to convince one that this notion of the determination of means by ends not merely differs, but is radically distinct from, that of physical determination by antecedent phenomena. It amounts to a complete inversion of the order of physical causation.*

To assume that since the idea of determination by ends involves a point of view essentially distinct from that of efficient causation the notion of end or purpose must therefore be put aside as a mere preliminary illusion of the intelligence—as a fiction which we accustom ourselves to suppose—is simply to beg the question.

The validity of this or that principle of explanation cannot be decided in a rough and ready fashion. It is not a question simply of the relative success of either principle in enabling us to string facts together in a more or less intelligible order. Both principles may assist us in doing so, and may thus claim to be so far regulative of experience.

To decide upon the limits of the validity of each and all of such principles or categories of explanation is the paramount function of a genuine philosophical criticism. It is to this that

* It is idle to fall back upon Hume's supposed metaphysical elimination of the idea of necessary connection, causal or other, in order to get rid of the difficulty raised by this distinction between efficient and final cause. This destructive criticism is quite as effective in destroying the foundations of ordinary scientific reasoning as in getting rid of the teleological conception. And it has been abundantly shown that on such a basis of philosophical scepticism as to the fundamental conceptions, *e.g.*, of cause and of substance, no system of human knowledge can possibly rest.—*Cf.* Green's *Introd. to Hume's Treatise on Human Nature*.

we must look to enable us to determine the relation to the whole of human experience of any one of the principles which appear to be implied in that experience. Before this tribunal the competing claims of teleology and purely physical determinism, as principles explanatory of Nature, must ultimately be brought. And when this is done it will invariably be found that it is impossible to allow the discussion of the fundamental conceptions of knowledge, like those of substance and cause, to proceed merely with reference to the phenomena of Nature conceived objectively.

In every criticism of the nature of knowledge which is not wholly superficial it will be found that there is involved a reference and a relation to the self-conscious subject of knowledge as the indispensable condition of all experience whatsoever.

This is neither the time nor the place to attempt to set forth what I take to be the results of such a criticism of the conditions of knowledge. I can only permit myself to affirm my own conviction that an impartial study of the problem thus suggested will result in a recognition that the conception of the cosmos—the object of human experience—as a mere system of material and mechanical relations in space and time is after all highly abstract and unreal. For certain purposes such a conception may be not only useful but indispensable, just as are the professed abstractions of mathematical science. But the hypothesis which regards the cosmos of experience as reducible to an endless series of phenomena in time and space, connected by a common bond of external necessity, entirely ignores the fundamental relation of all fact whatever to a knowing subject as the essential condition of all experience. No hypothesis which abstracts from this reality can possibly claim to offer a satisfactory interpretation of things. And it will be found whenever full recognition is afforded to the one inalienable condition of experience, that, amongst other ideas, that of final cause or purpose must be reinstated as a valid and necessary principle of explanation in any philosophical interpretation of the world.

It is a consequence of the acceptance of such a philosophical doctrine that although, even in biology, we must, if we wish to

make progress on truly scientific lines, continue to bring all the facts of observation and experiment under the dominant idea of mechanism or physical causation, yet we are continually forced to recognise the incompetence of the mechanical principle to satisfy the intellectual demand for a full comprehension of the significance of living process. And this inadequacy becomes the more glaring as the phenomena to be investigated approximate more and more to the character of manifestations of conscious intellectual activity.

The difficulty arising out of the confusion of two points of view, emerges in one of its most impressive and characteristic forms in the efforts to apply the principle of evolution, in its guise as a principle of natural history, to the manifestations of human activity in social institutions and laws of conduct.

It has indeed been one of the triumphs of the historical method to have largely "emancipated our views of the past from their bondage to the ideas of the present" by means of "the conception of the evolution of man by interaction with his environment."

In its more extreme form, however, this idea of human evolution has been interpreted on the lines of organic evolution generally, as a sequence of natural phenomena causally connected by the aid of the principles of variation, heredity and natural selection.

Earlier in this address I have referred to the representation of natural selection operating upon indefinite variation, as a means of explaining organic adaptation as a purely naturalistic process.

Even as applied to the lower stages of organisation, we saw that this reduction could not be regarded as having been actually effected, so long as the residual phenomenon of variation remained unexplained. Evolutionary adaptation still remains dependent upon an inherent "spontaneous," [or] at least an unexplained variability.

And when we come to apply the conception of evolution to the products of conscious human activity, we find ourselves upon still more uncertain ground.

The late Prof. Huxley, in the last of his memorable and striking utterances, once again proclaims his deeply-rooted faith in the ultimate unity of all "cosmic process," expressing itself in secular evolution. But he found himself, nevertheless, compelled to postulate within this process a kind of countermovement as regards natural selection, when he is considering certain aspects of human evolution.

"The faith that is born of knowledge," Prof. Huxley says, "finds its object in an eternal order, bringing forth ceaseless change through endless time, in endless space; the manifestations of the cosmic energy alternating between phases of potentiality and phases of explication."

The aspect of cosmic activity which the great apostle of evolution singles out for special treatment in the essay to which I allude, is what we may call the human episode in the cosmic process. This episode, you may remember, he sets forth under the metaphor of a garden, cut off from the unreclaimed bush of general cosmic activity, and tended, watered, and otherwise protected from the incursions of wild animals and the hurtful competition of noxious and undesirable plants. He is not concerned with the origination of the garden, for obviously this must be regarded as in some sense due to the operation of the ordinary laws which govern the entire region. The domesticated area must in some natural way have become shut off from the wild-wood. But he is specially concerned with the fact that, given such a garden, the denizens of it are now largely protected from the operation of the ordinary natural and competitive conditions prevailing outside its limits. By this he attempts to convey the notion that one aspect of the result of human evolution by natural selection has been the limitation, within the garden of human society, of the operation of those very conditions of struggle and survival to which its genesis is owing. And he accordingly proclaims the "apparent paradox" that "ethical nature while born of cosmic nature is necessarily at war with its parent."

No scientific writer of modern times has exhibited a greater mastery of apposite and forcible metaphor than Mr. Huxley. But there have been occasions like that I now refer to when the metaphor is so forcible that it appears to carry off its author bodily.

If ethical process is really the legitimate offspring of the cosmic process, then all the features subsequently revealed in the former have surely a full hereditary title to the name and privileges of the parent. And indeed Mr. Huxley was forward to remark that none was more willing than he to admit the ultimate identity of the two kinds of process. And yet he immediately pushes the idea of the war between offspring and parent so as to warrant the conclusion that the processes somehow become essentially distinct.

It is by no means hard to perceive that the source of the so-called paradox is to be found in Mr. Huxley's identification of "cosmic process," in its evolutionary aspect, chiefly if not entirely with the principle of natural selection. And of course when he goes on to recognise that a condition of human progress on the ethical side has been a restriction and limitation of the struggle for existence amounting almost to the suppression of its internecine features, he is constrained to express the difference as a war between parent and child, between the cosmic and the ethical processes. But surely, and I say it with all respect, this is the most utterly obvious fallacy. *Either* the forms and institutions of ethical activity are a non-natural product, and no genuine daughters of the cosmic process, or else they are as much *cosmic* in their origin and essential nature as are the satellites of Jupiter. How can they, from Prof. Huxley's point of view, ever cease to be cosmic or even begin to become anything else?

Such is the preliminary difficulty or confusion. Let us see how it works out in other directions. Allusion is made to "bee society" as a somewhat analogous phenomenon to that of human society. "Bee society," we are informed, "is the direct product of an organic necessity impelling every member of it to a course of action which tends to the good of the whole. Each bee has

its duty and none has any rights." [Has not the queen as much right to her special appointments as any human monarch to the regal accompaniments of his function? At any rate, if we cannot here speak of a "right," as little can we talk of a "duty."] "In the same sense as the garden or the colony is a work of human art, the bee polity is a work of apiarian art brought about by the cosmic process working through the organisation of the hymenopterous type." Again, he says, "I see no reason for doubt that at its origin human society was as much a product of organic necessity as that of the bees." Then he points out that self-assertion in man is a survival of the original "organic necessity" out of which human polity arose, and that certain "organic necessities" operate as checks upon this "self-assertion," as, for example, family affection, sympathy, &c. "We come to think," he continues, "in the acquired dialect of morals." "An artificial personality, 'the man within,' as Adam Smith calls conscience, is built up beside the natural personality. He is the watchman of society, &c., &c." He then goes on:—"I have termed this evolution of the feelings out of which the primitive bonds of human society are so largely forged, into the organised and personified sympathy we call conscience, the 'ethical process.'" But since Prof. Huxley has already taught us to regard this as the natural offspring of the cosmic process arising at the stage of organic necessity, whence comes the arbitrary distinction between the one as "natural" and the other as "artificial?" Surely, the identity of origin forbids us to pit the one against the other as of alien growth! The ethical, if recognisable at all, is "cosmic" through and through, and it is vain to talk as if they were each manifestations of distinct principles.

In the treatment of bee polity, the explanation offered is that it is "a product of an organic necessity impelling every member of it to a course of action which tends to the good of the whole."* Yet when a not dissimilar limitation of the struggle for existence amongst the individuals comprising human society has to be

* This is of course pure "cosmic" activity.

characterised, it is no longer "cosmic," but "ethical," conceived as directly antagonistic to the former.

I have criticised these views at length because I think it is plain that the source of the confusion is that arbitrary identification of organic "cosmic" process with the process of Natural Selection on a basis of struggle with elimination of the unfit. Now, Mr. Huxley's proclamation that this principle does not prevail in an unmodified form in human society; and even that, to a large extent, the progress of human society does not depend upon the struggle for existence, is tantamount to a declaration that Natural Selection is *not* the sole and only factor in the movement of the cosmic process. For it is strictly inevitable that we should take the latter in the full and only legitimate sense as embracing the entire conditions of the ethical process as fully as it does the necessities, organic or other, which direct and control either bee society or planetary movements.

I am not here concerned to inquire whether or how far human progress as a manifestation of "ethical process" is characterised by such a suppression of the struggle for existence as has been insisted on. Whether there is substituted for it, in the later phases of human evolution, a struggle for the means of enjoyment, as Mr. Huxley held, or a struggle for existence, with survival of the fittest, not of individuals, but of ideals of action, as Mr. Ritchie believes, is also a matter which may be left undiscussed.

But the admission that the mere extension of the Darwinian theory of natural selection is not fitted to account for the evolution of human society and institutions, at least in the later phases of that process, is one which, as coming from Mr. Huxley's maturer thought, cannot be lightly passed over.

The fact is that when we reach the higher planes of "cosmic process," including in this term the "ethical" element with which Mr. Huxley can only be said to juggle, we find,—not indeed a reason to deny the applicability of the methods of explanation which have proved useful in dealing with simpler phenomena—but that these are no longer to be recognised as capable of satis-

fyng the intellectual demand which the situation makes upon our thought. Such satisfaction as they convey is but formal. The thirst for explanation of the really significant aspect of the complex phenomena of human activity remains practically unquenched.

There may be a relative truth in such a statement as that the phenomena of human history and conduct, the manifestations of the human spirit in art and literature, and of such thought-products as pure mathematics or the more concrete sciences, may be viewed as products of physical sequences in the way of redistributions of matter and energy. In a sense, again, we may be entitled to say that the human events thus conceived have been manifested and epitomised in a structurally variable germplasm, perpetuated by natural selection, and unfolded and brought to fuller fruition as episodes in the functional activity of the modified protoplasm of nerve tissue.

I neither doubt the possibility nor deny the desirability for certain purposes of naturalising in this way the facts and processes of conscious human activity.

Every mode of explanation is relative to a certain point of view. Thus, it will be generally admitted that the hypothesis of human society as constructed solely on the basis of the idea of wealth is incompetent fully to explain the concrete phenomena either of individual or of a corporate social and national life. Yet the science of political economy which to a large extent depends on such an hypothesis has nevertheless its own value and function. Or again, I may borrow an illustration from an essay from which I have already quoted, and point out that "no physicist really supposes that he is dealing with anything else than a metaphysical abstraction as distinguished from a real object, in a purely kinematical investigation."

But the utility of such admittedly provisional hypotheses becomes ever the less the more the obvious complexity of the actual fact obtrudes itself upon our mental horizon. In spite of ourselves our point of view becomes altered; and it is no small part of the discipline of the scientific intelligence to avoid the

confusion of different categories of explanation; to "put himself aside and let Nature speak," Nature, that is to say, which is for him a purely mechanical system.

And it is just such a confusion of thought which on the other hand permits the presentation of scientific and physical formulas as if these exhausted the reality of living or conscious activity or were other than lame and often grotesque travesties of the actual content of the phenomena in question.

I have already tried to show that at the root of the modern doctrine of natural selection (survival of the luckily endowed) there lies the mechanical principle of external necessity in a determining environment. I have indicated my conviction that it is this aspect of it which vitiates its attempt to explain by itself the ethical aspect of human evolution, and which seemed to give point to the self-contradictory notion of a conflict between the cosmic and the ethical principle.

The *fact* of a continued process of human evolution cannot be withstood. But we may readily follow Mr. Huxley in his assertion that natural selection does not satisfactorily account for the later phases and stages of it. If, then, we are to retain our grasp of the essential identity of all cosmic process, we must be prepared to recognise that if the end is not intelligibly to be conceived as mere mechanism neither can the beginning be so explained.

And what is true in relation to the ethical aspect of cosmic process as revealed in human society, is true also of the organic aspect of that process as revealed in plant and animal life. The mechanical interpretation is only a convenient, a provisional, above all a working, hypothesis. As a final or philosophical interpretation it is false, because it ignores one, and that the really significant aspect of the facts viewed from the general philosophical point of view.

And, exactly as in the case of the ethical process, it does not help us much that we are able, by the aid of the doctrine of evolution, to trace back the series of living forms to their simplest, most formless, and structureless beginnings. "The continuity of all existence," which is the essence of the evolu-

tion idea, "may be interpreted," says one writer, "in two very different ways. It may lead us either to radically change our notions of mind and its activities, or to 'radically change our notions of matter.' We may take as the principle of explanation either the beginning or the end of the process of development. We may say of the simple and crass, 'There is all that your rich universe really means'; or we may say of the spiritual activities of man, 'This is what your crude beginning really was.' We may explain the complex by the simple or the simple by the complex."

"And one of the most important questions for morality and religion is the question, which of these two methods is valid. If out of crass matter is evolved all animal and spiritual life, does that prove life to be nothing but matter; or does it not rather show that what we, in our ignorance, took to be mere matter was really something much greater? If 'crass matter' contains all this promise and potency, by what right do we still call it 'crass'?"

"It is manifestly impossible to treat the potencies, assumed to lie in a thing that grows, as if they were of no significance; first to assert that such potencies exist, in saying that the object develops; and then, to neglect them, and to regard the effect as constituted only of its simplest elements. Either these potencies are not in the object, or else the object has in it, and is, at the first, more than it appears to be. Either the object does not grow, or the lowest stage of its being is no explanation of its true nature."

In this way may a perfect loyalty to the evolution doctrine throughout the entire domain of cosmic process, from its lowest to its highest manifestations, bring with it an emancipation from bondage to those mechanical principles which seem alone suggested on the lower plane of the inorganic and which may, for certain purposes, though with more conscious effort, be applied throughout the whole sphere of objective science.

On the motion of Mr. Henry Deane, M.A., a most cordial vote of thanks was accorded to the President for his interesting Address.

The Hon. Treasurer read his final report on the Society's financial condition and outlook, and presented his accounts and balance sheet, duly signed by the Auditors as correct. From these it appeared that the balance standing at the credit of the Society on both Income and Bacteriology accounts was £607 14s. 2d., but that when the Society's income account only was considered, there was a small excess of expenditure over income for the year amounting to £6 3s. 11d.

On the motion of Rev. J. M. Curran, seconded by Mr. W. W. Froggatt, the Hon. Treasurer's report was adopted.

On the motion of Mr. J. R. Garland, seconded by Mr. W. S. Dun, a resolution expressive of the Society's regret at Dr. Norton's retirement from the office of Hon. Treasurer, and of its weighty obligations to him for his valuable services during a period of sixteen years, was carried with acclamation.

The following gentlemen were elected to fill eight vacancies in the Council :—Professor J. T. Wilson, M.B., Ch.M. (PRESIDENT), J. C. Cox, M.D., F.L.S., Thomas Dixon, M.B., Ch.M., Prof. W. A. Haswell, M.A., D.Sc., F.R.S., Hon. James Norton, LL.D., M.L.C., Perceval R. Pedley, Prosper N. Trebeck, J.P., Walter W. Froggatt, F.L.S.

And as AUDITORS : Hugh Dixon, J.P., Edward G. W. Palmer, J.P.

ENDOWMENT (CAPITAL).

	£	s.	d.	£	s.	d.
Amount received from Sir William Macleay in his life-time	14,000	0	0	3,000
Further Sum bequeathed by Will, £6,000, less Probate Duty	5,700	0	0	5,000
						11,700
						0
						£19,700
						0
						0

BACTERIOLOGY (CAPITAL.)

	£	s.	d.	£	s.	d.
Legacy of £12,000, bequeathed by Sir William Macleay to the University of Sydney (less £600 probate duty), paid by the University into Court and ordered to be paid out to the Society	11,400	0	0	11,400
Amount (out of interest received) ordered by the Council to be added to Principal	700	0	0	700
						0
						£12,100
						0
						0

March 8th, 1898.

Audited and found correct.

E. G. W. PALMER, Auditor.

JAMES NORTON, Hon. Treasurer.

ENDOWMENT (INCOME).

[illegible]

March 8th, 1898.

Audited and found correct.

F. G. W. PALMER, Auditor.

JAMES NORTON, Hon. Treasurer.

BACTERIOLOGY (INCOME.)

Balance as per Statement of 1896	...	£	s.	d.
Error in Statement of 1895	...	1,717	2	11
Twelve months' interest at 4 % on £11,400, part of £24,000 (Loan C) to October 30th, 1897.	...	5	17	2
Twelve months' interest on £900 lent out of income, also forming part of Loan C	...	456	0	0
		36	0	0
		<hr/>		
		£2,215	0	1
		<hr/>		

March 8th, 1898.

Audited and found correct.

E. G. W. PALMER, Auditor.

JAMES NORTON, Hon. Treasurer.

F. CUNNINGHAME & CO., PRINTERS, 146 PITT STREET, SYDNEY.

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(1897.)

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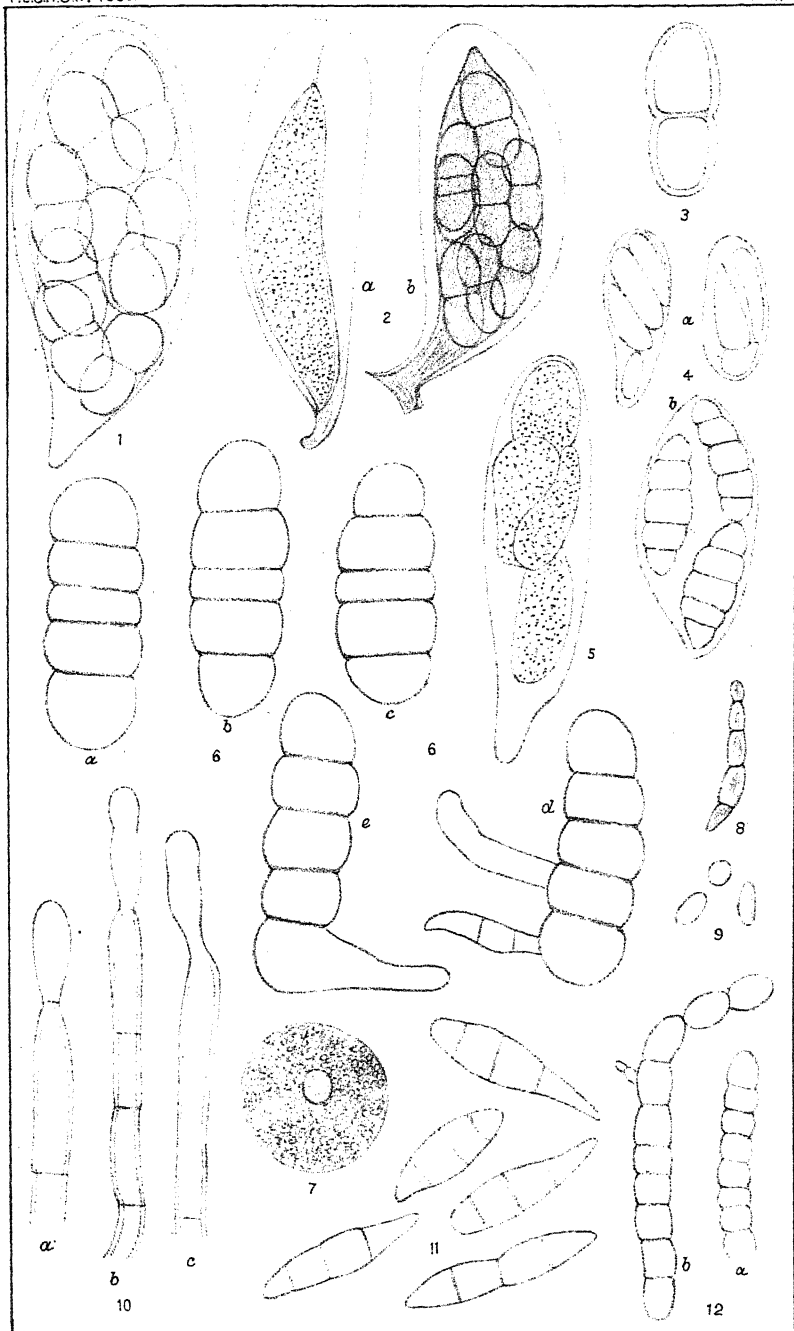
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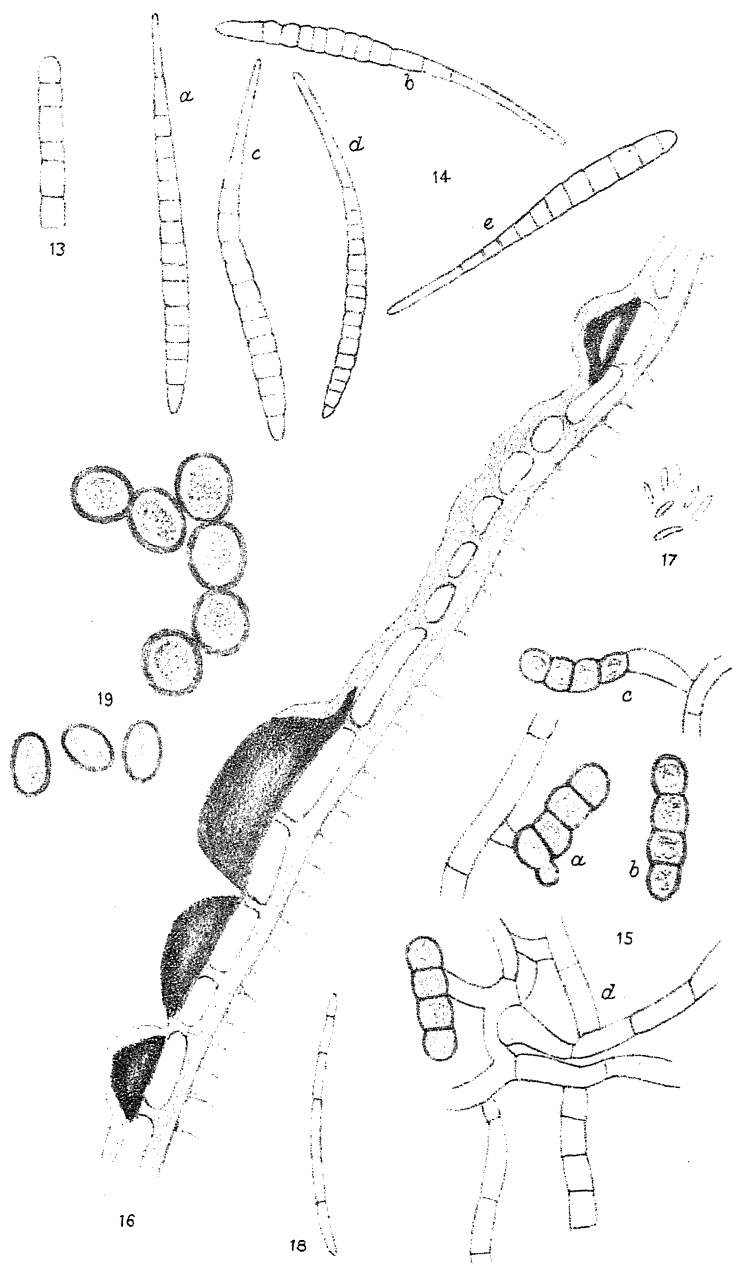
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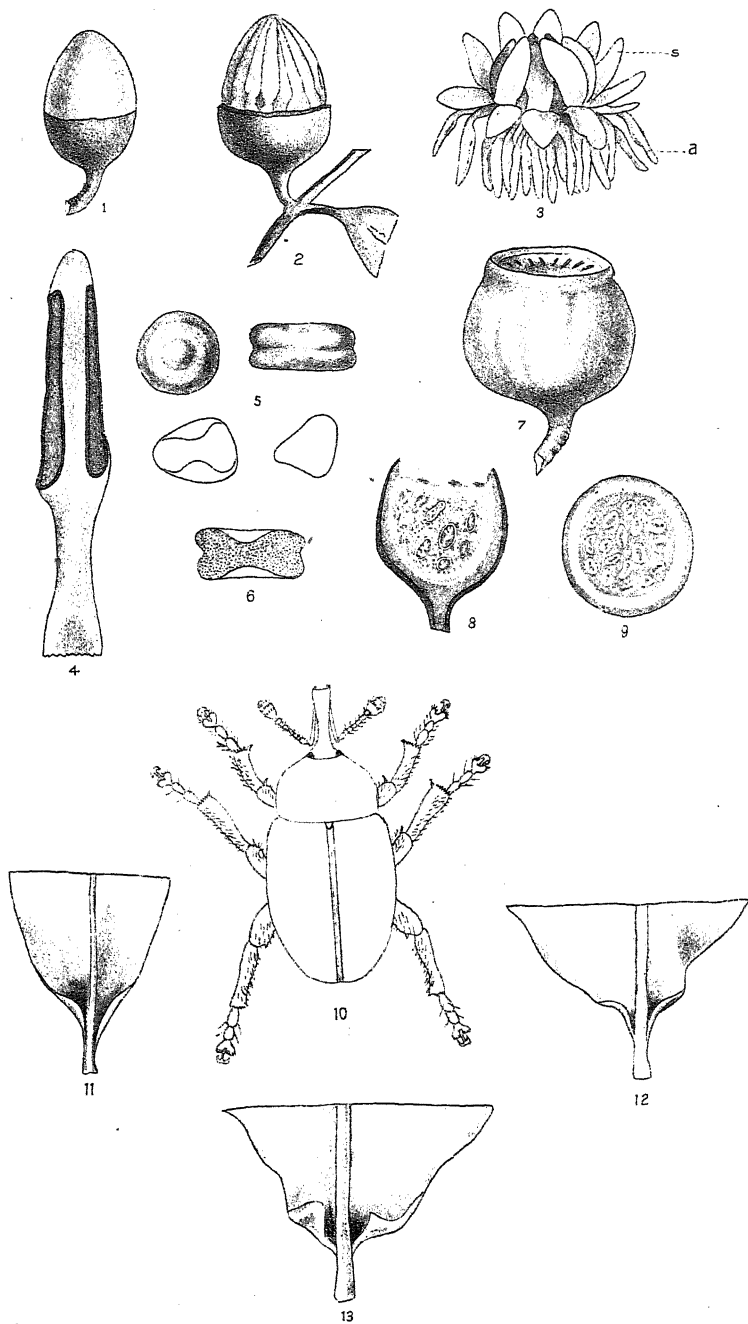
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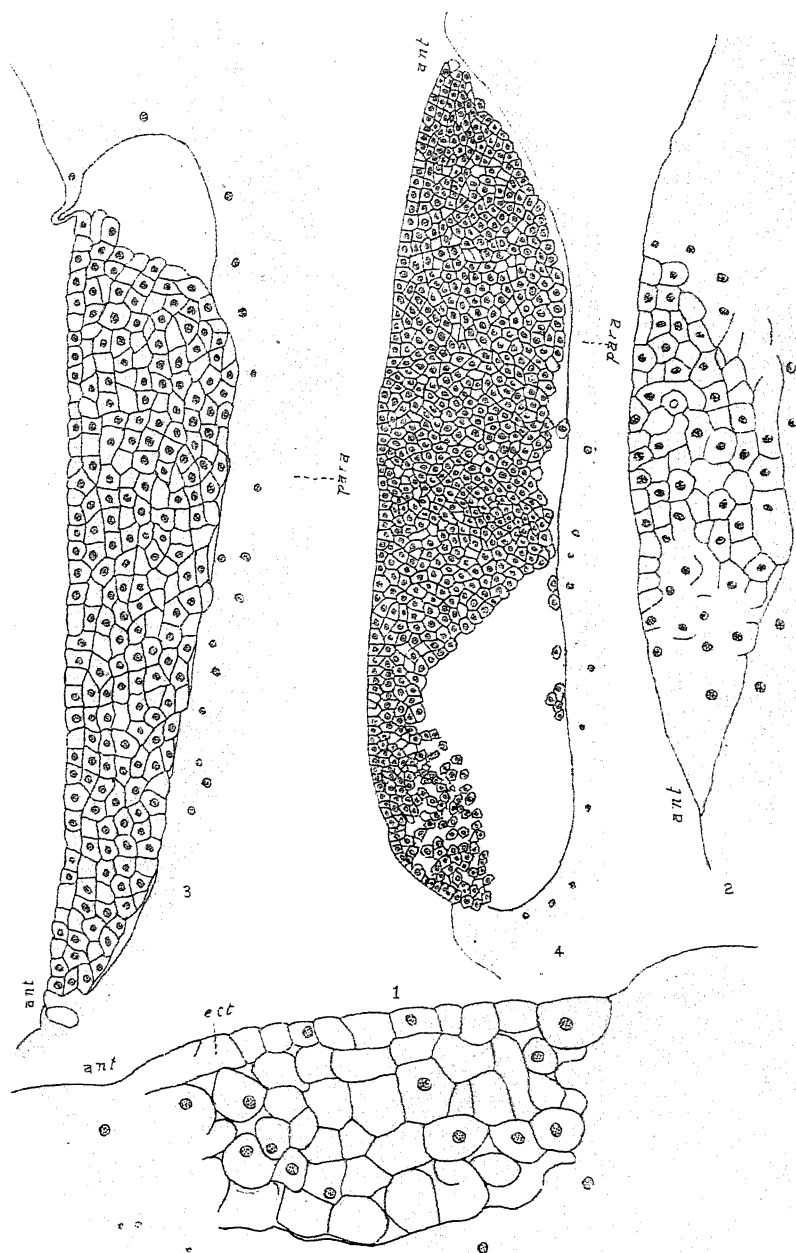


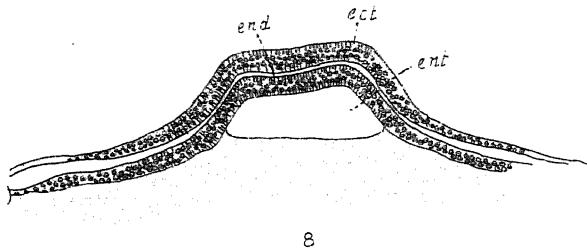
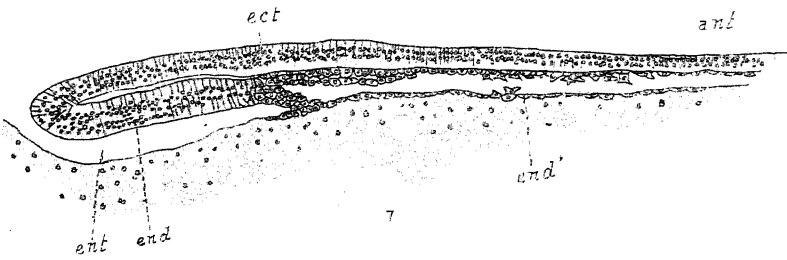
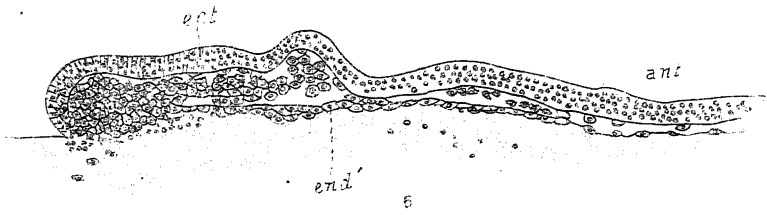
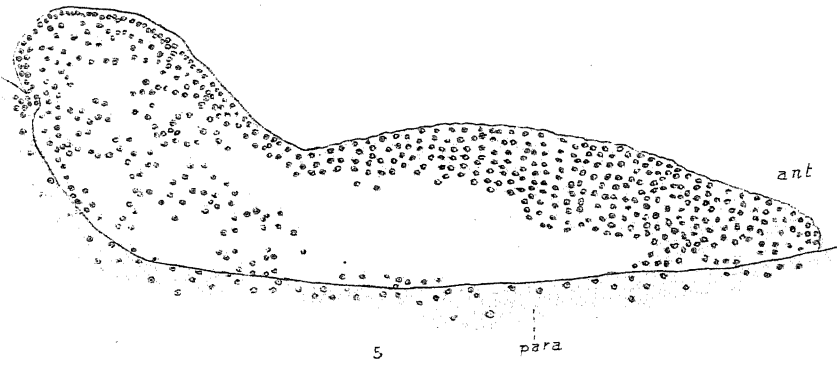


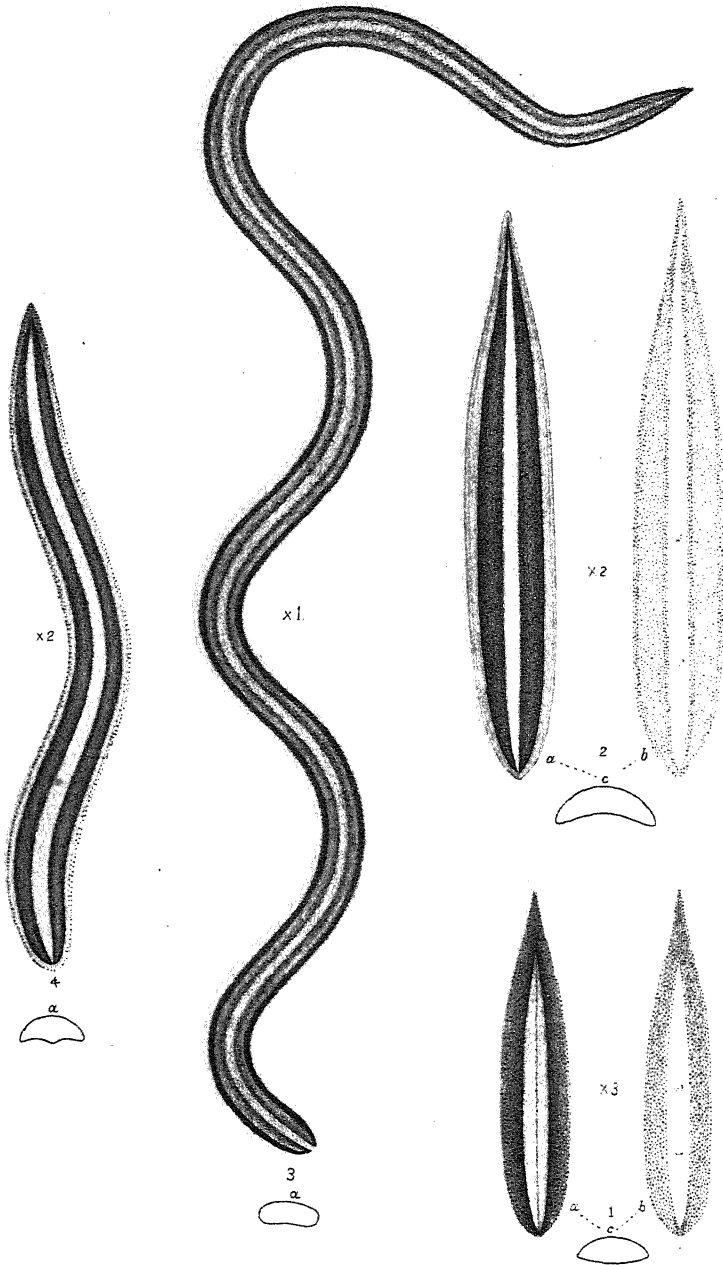
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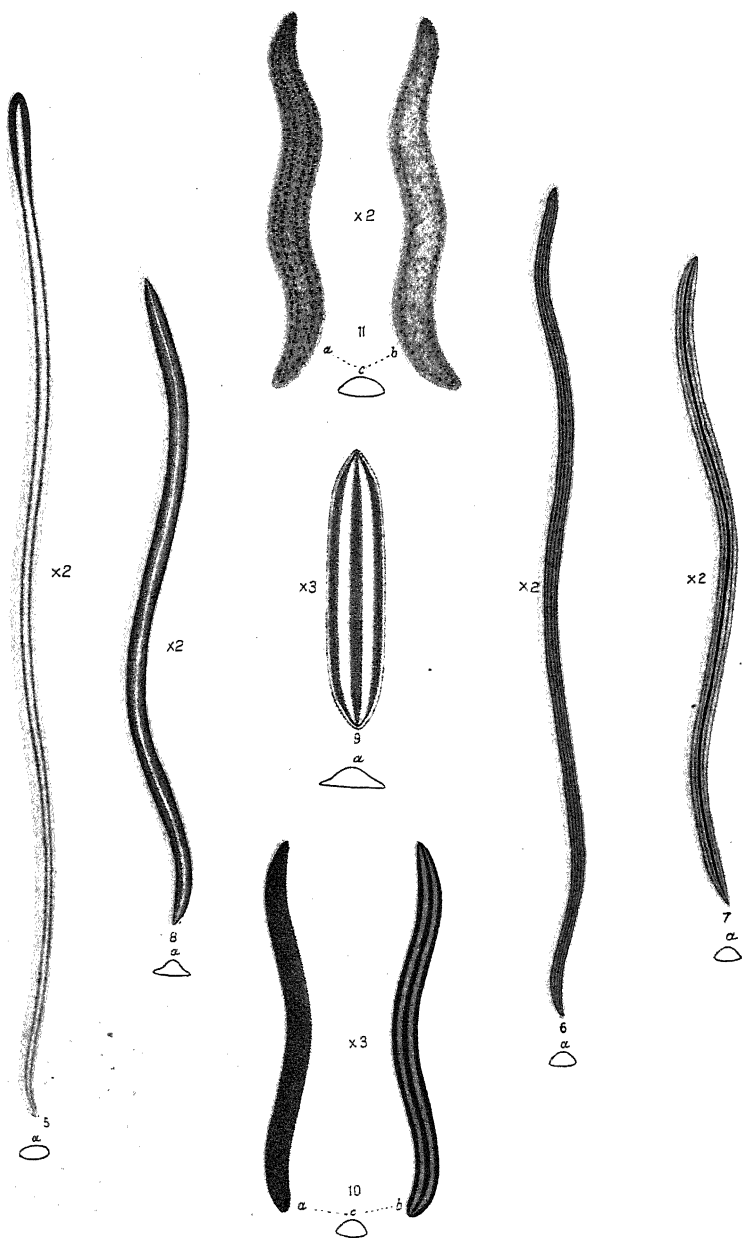
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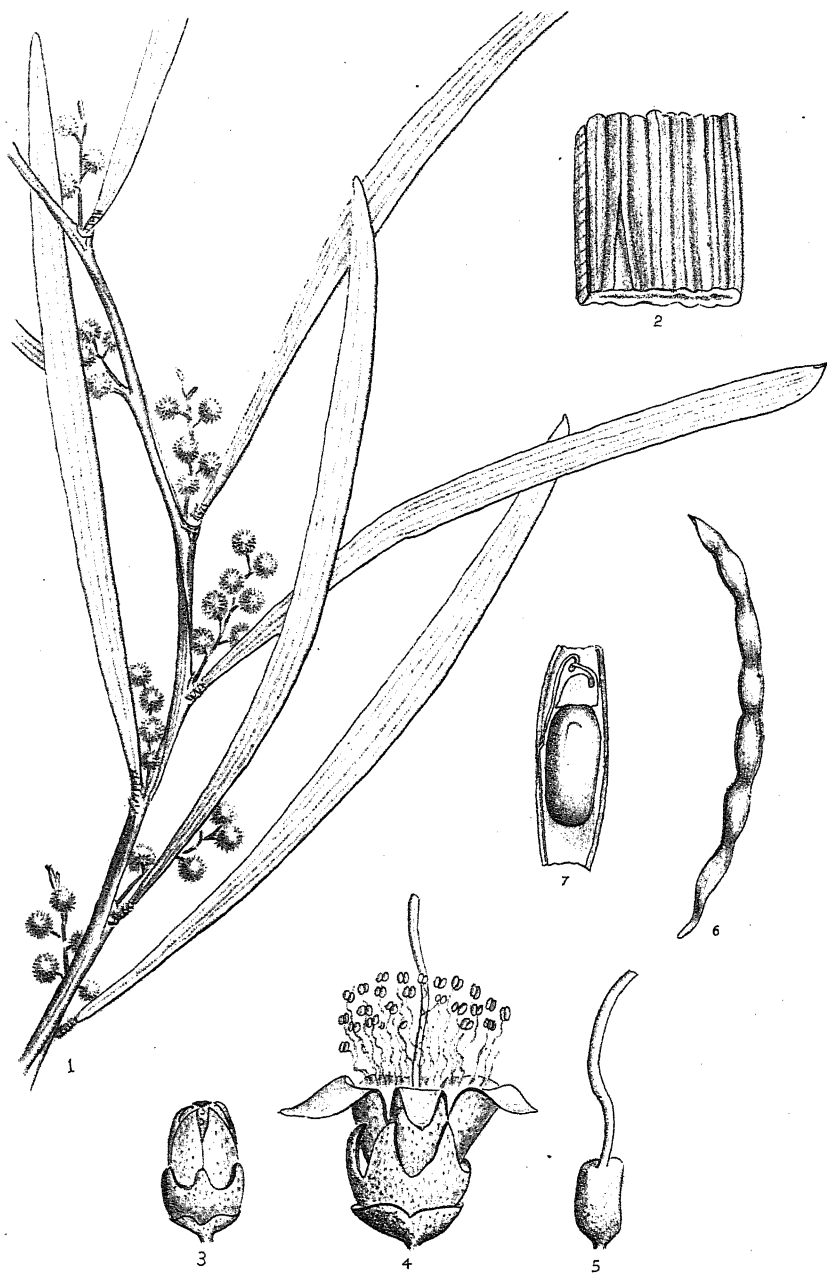






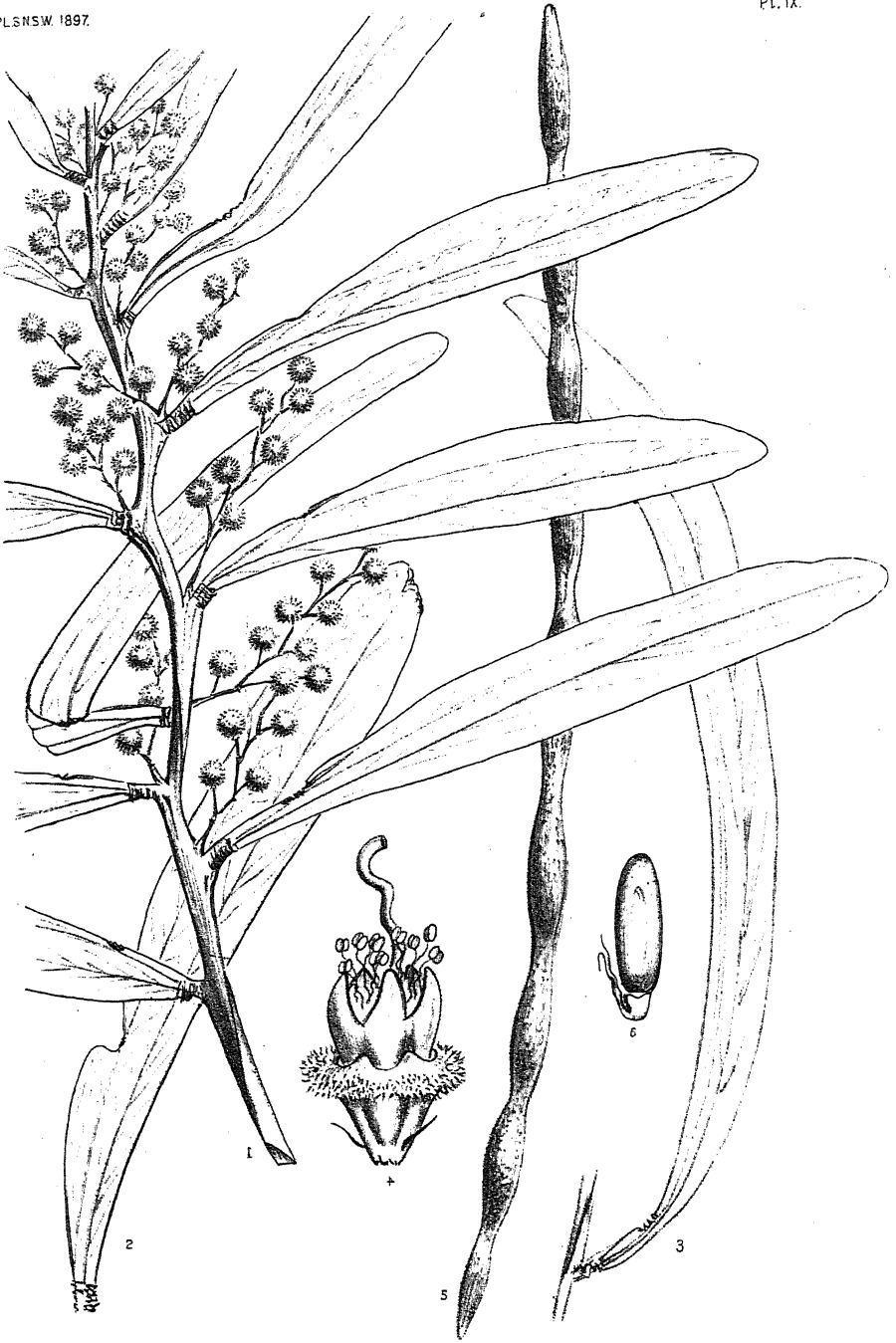






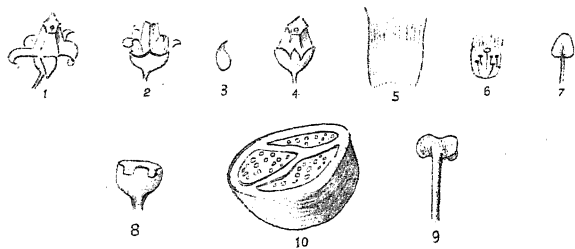
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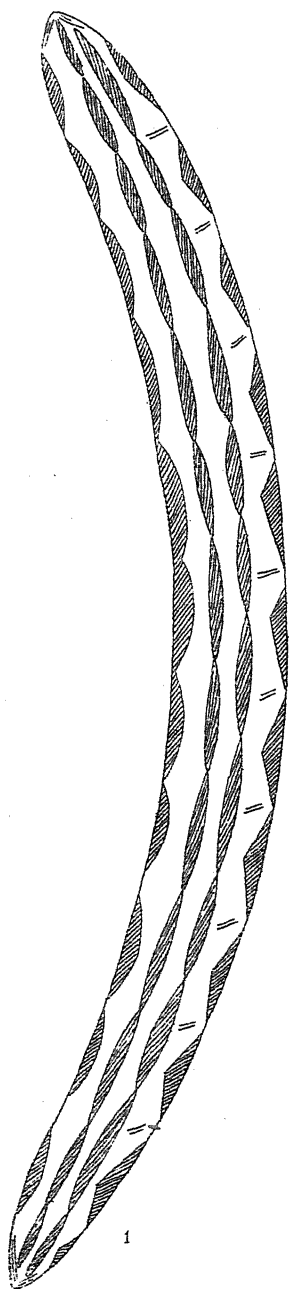


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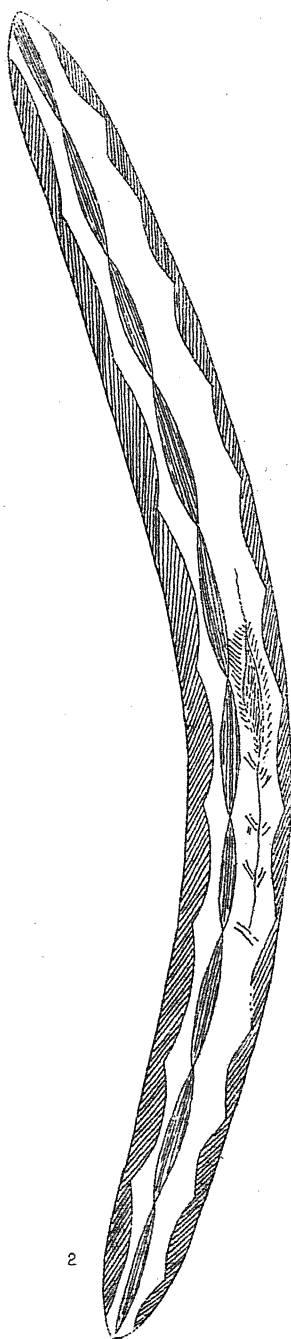


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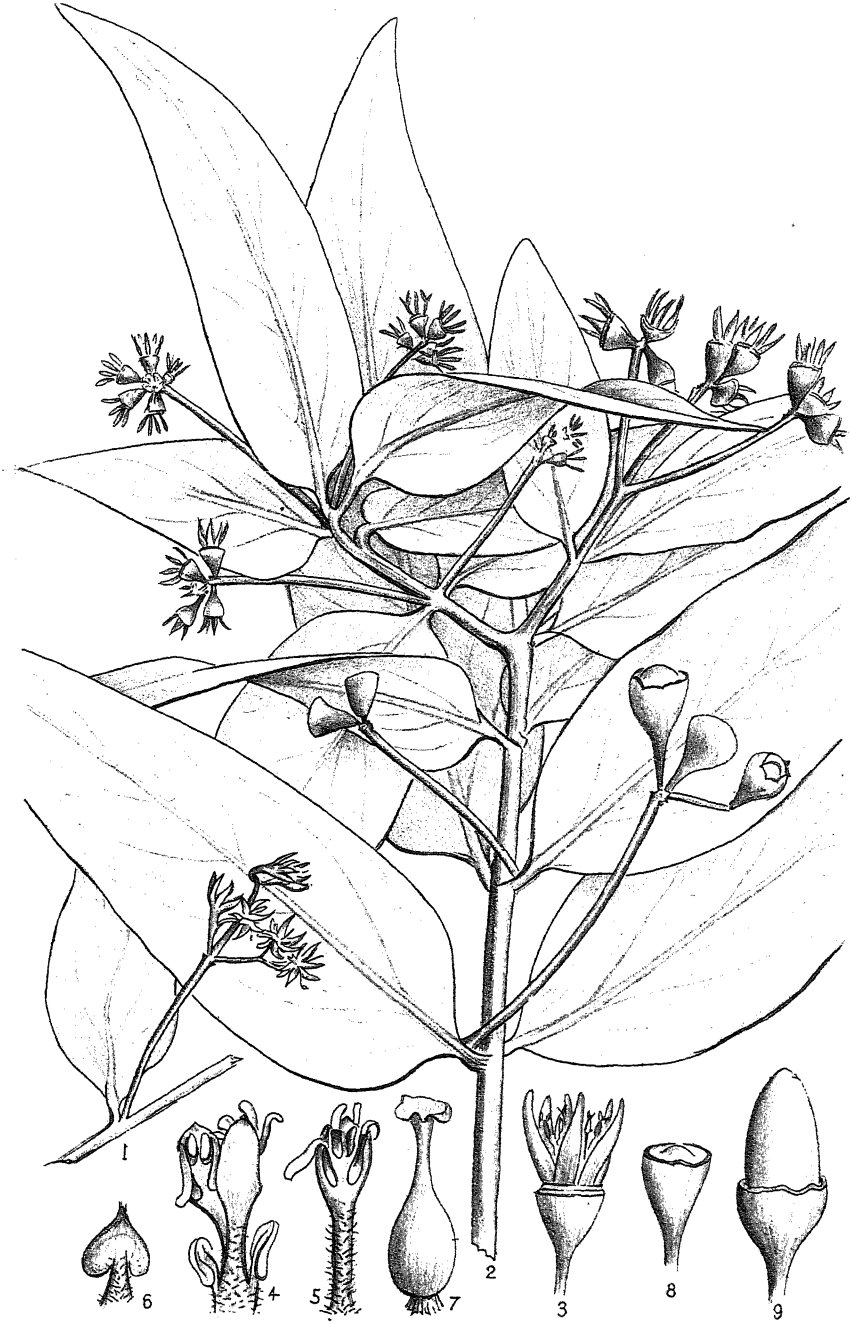
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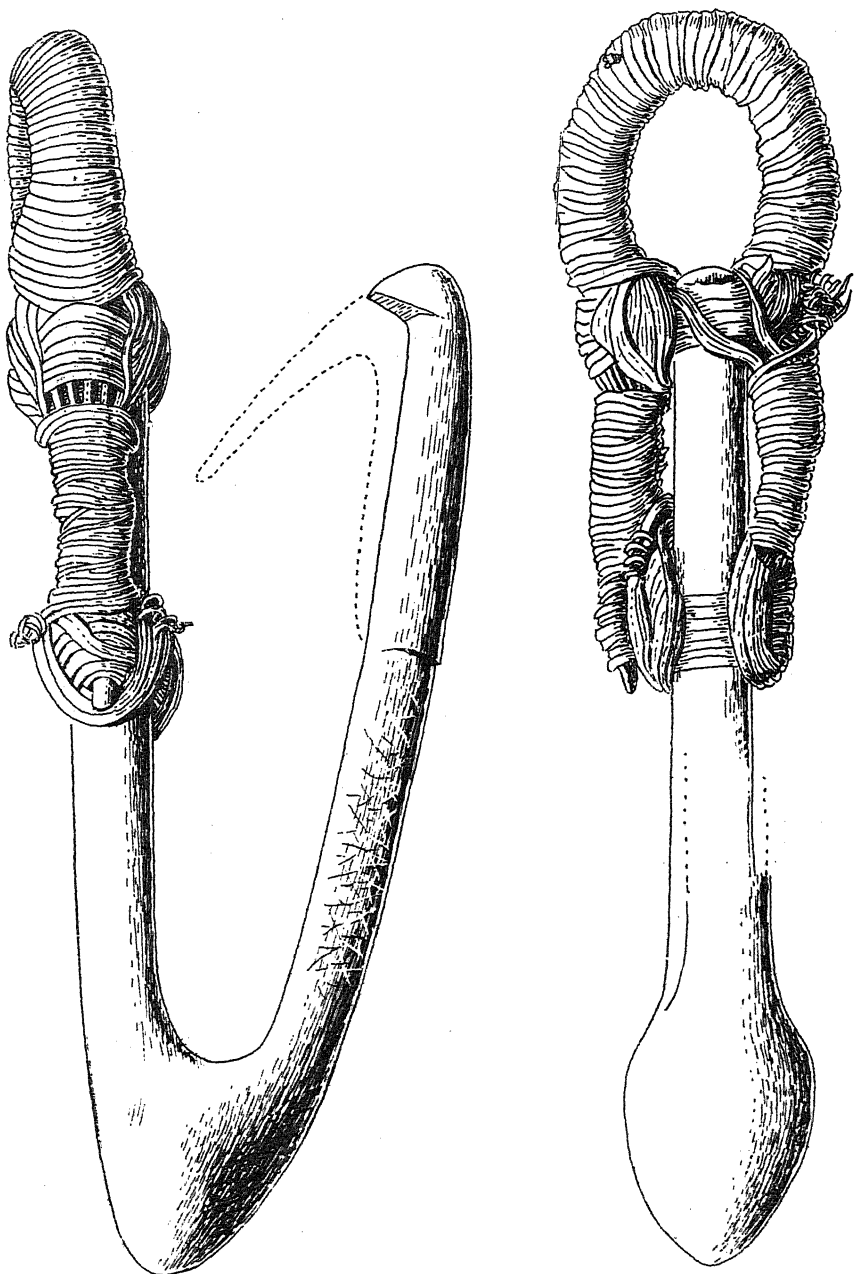
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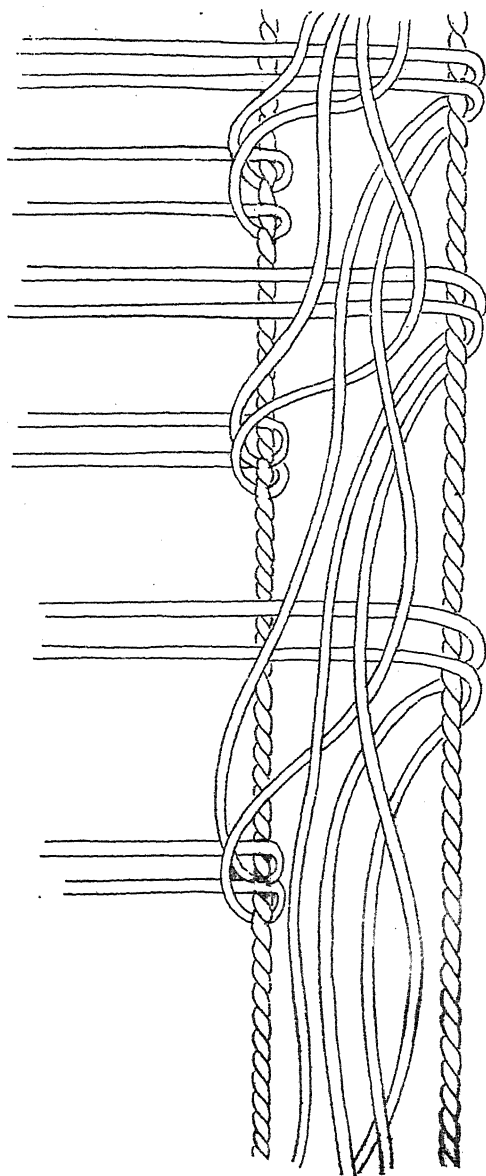


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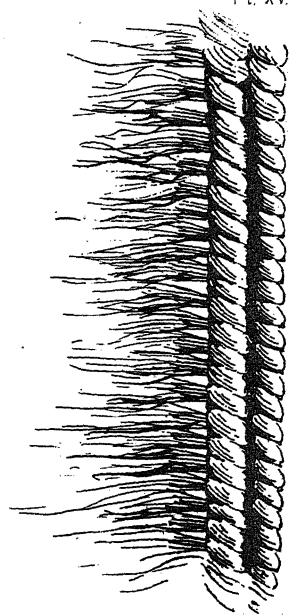
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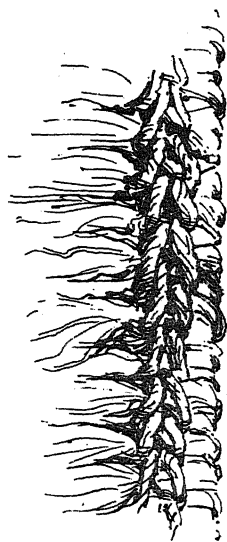
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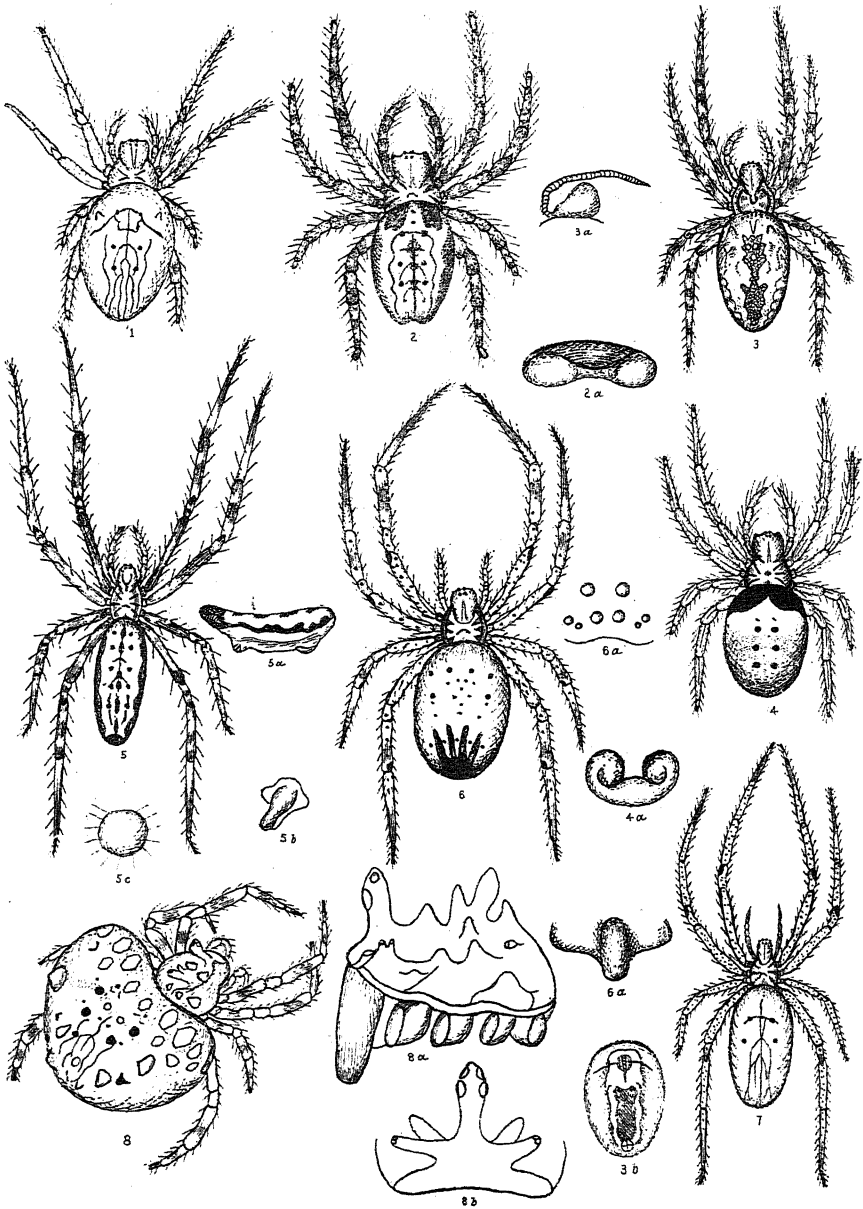


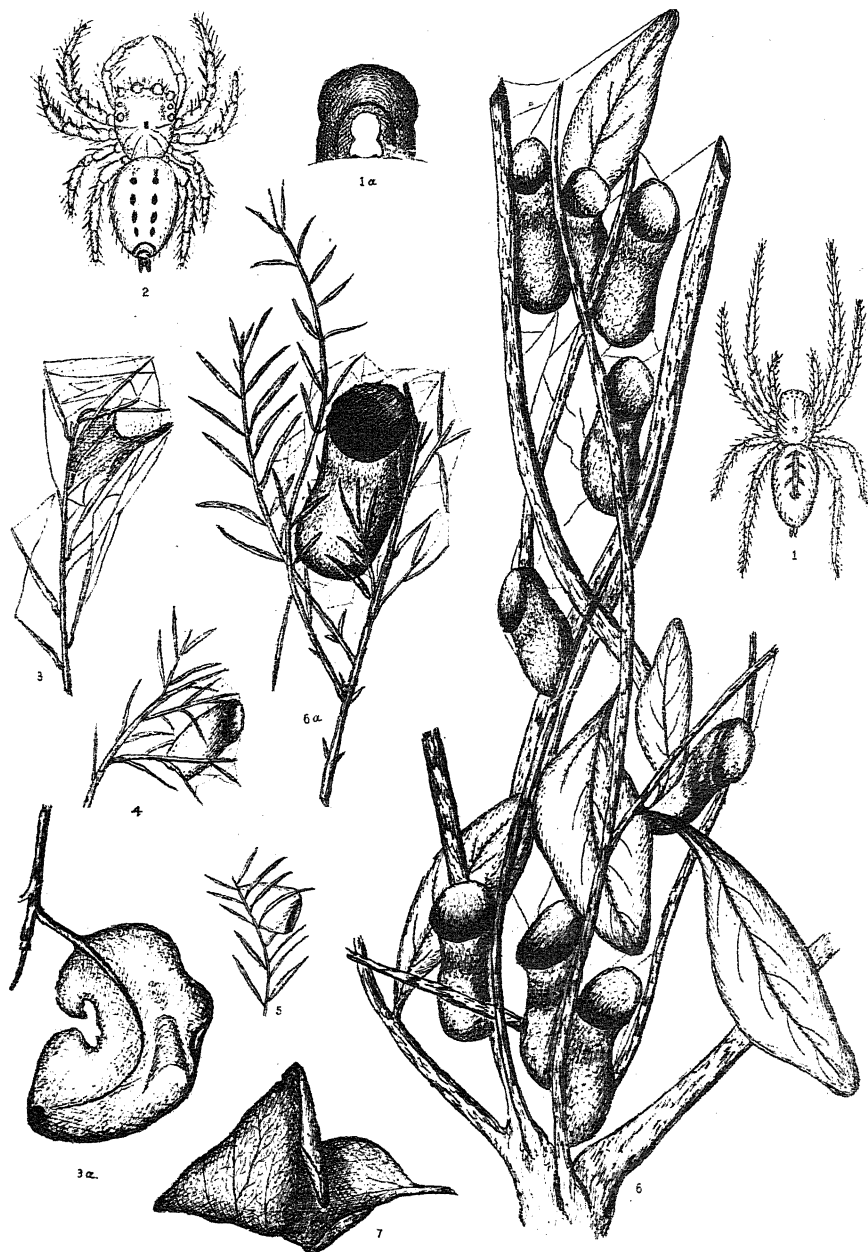
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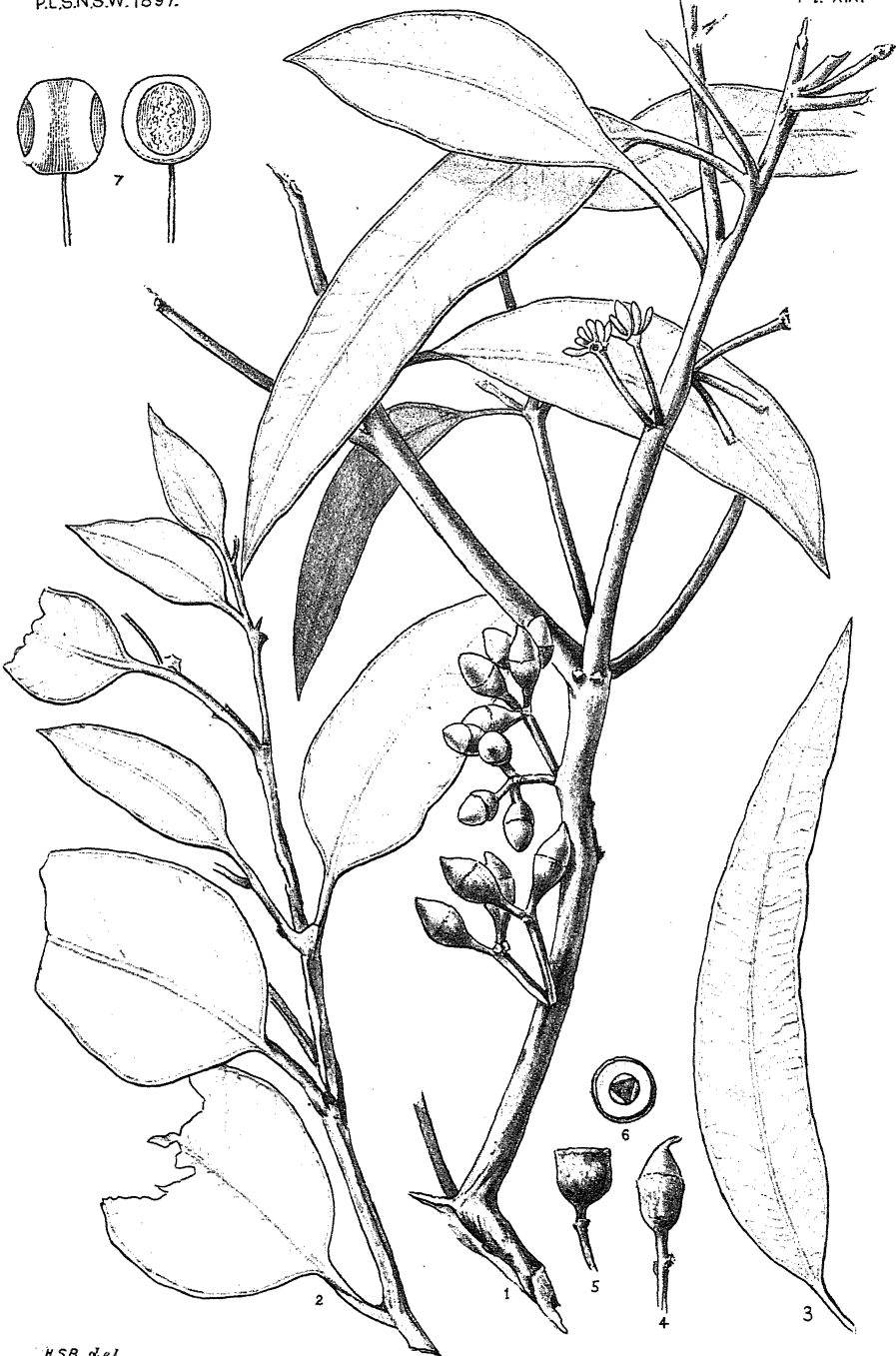


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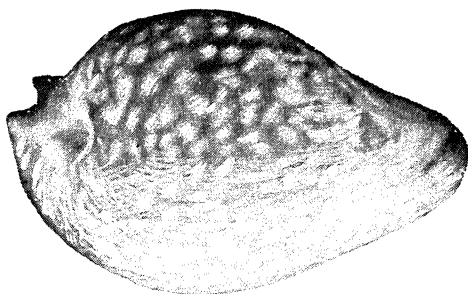




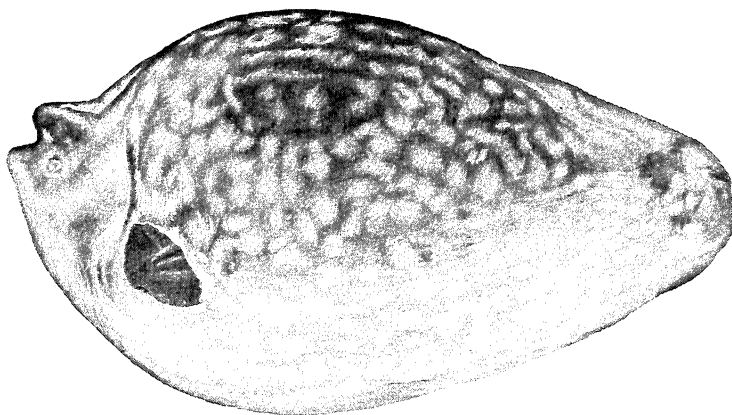


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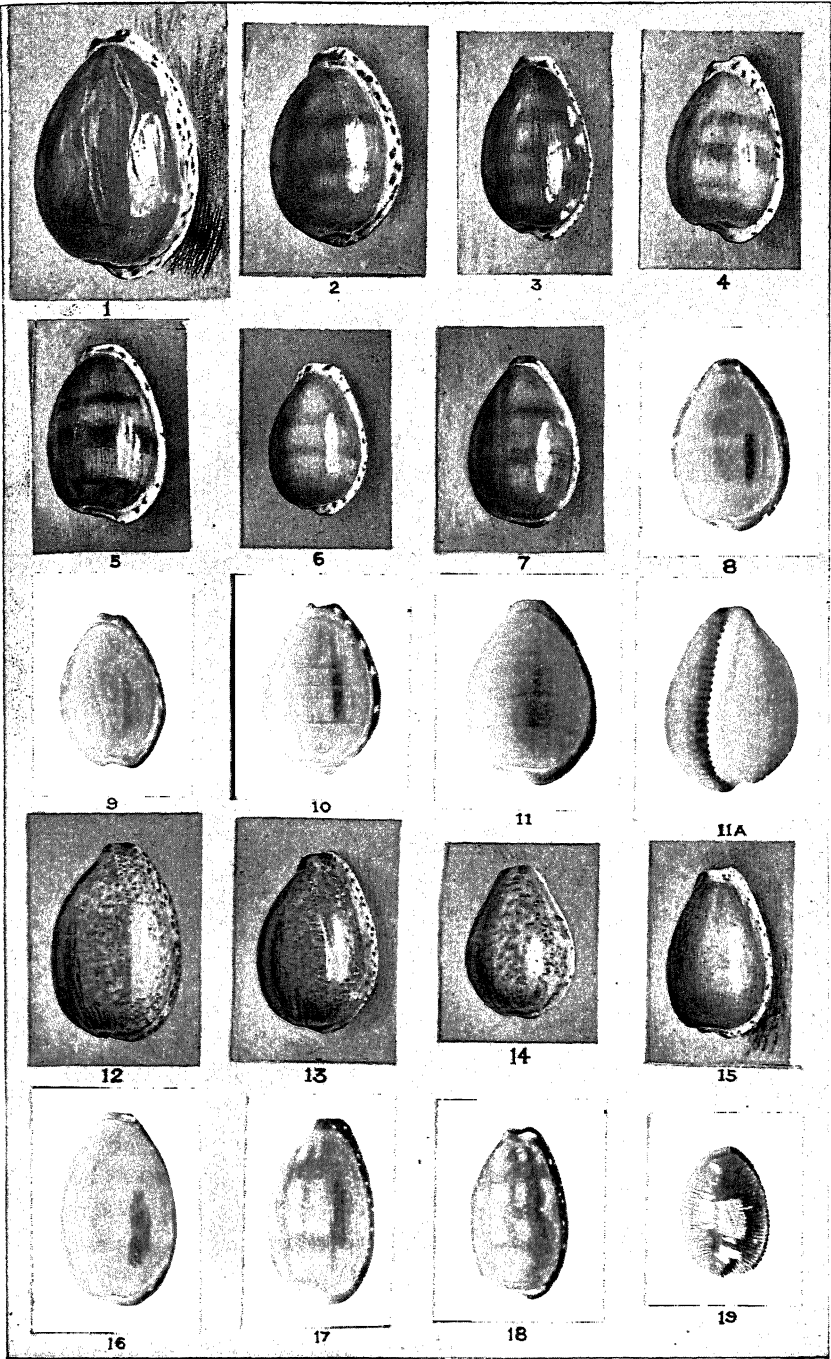
EUCALYPTUS SQUAMOSA, DEANE ET MAIDEN.



CYPRÆA UMBILICATA, G. B. SOWB.



CYPRÆA UMBILICATA, G. B. SOWB.



TASMANIAN CYPRÆAS



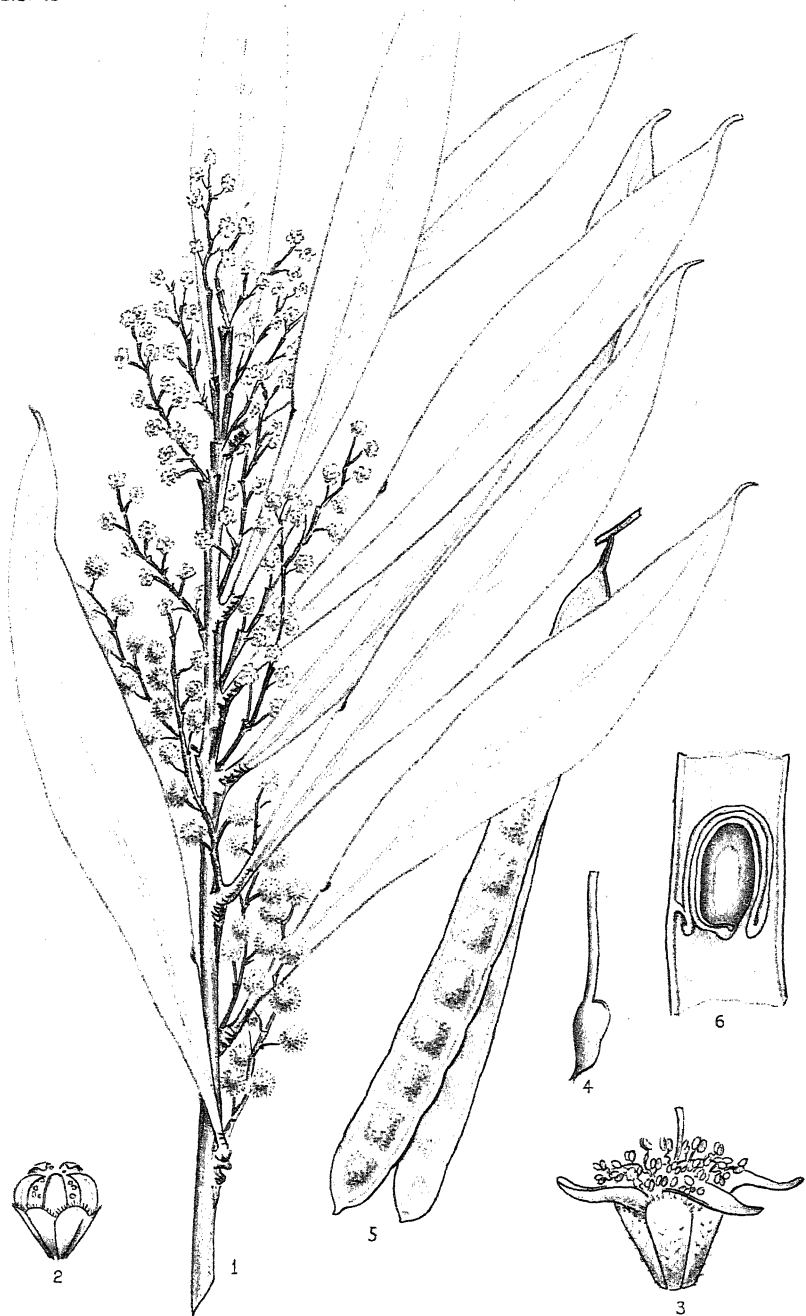
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ACACIA GLADIIFORMIS, A. CUNN.



R.T.B. del.

ACACIA OBTUSATA, SIEB.



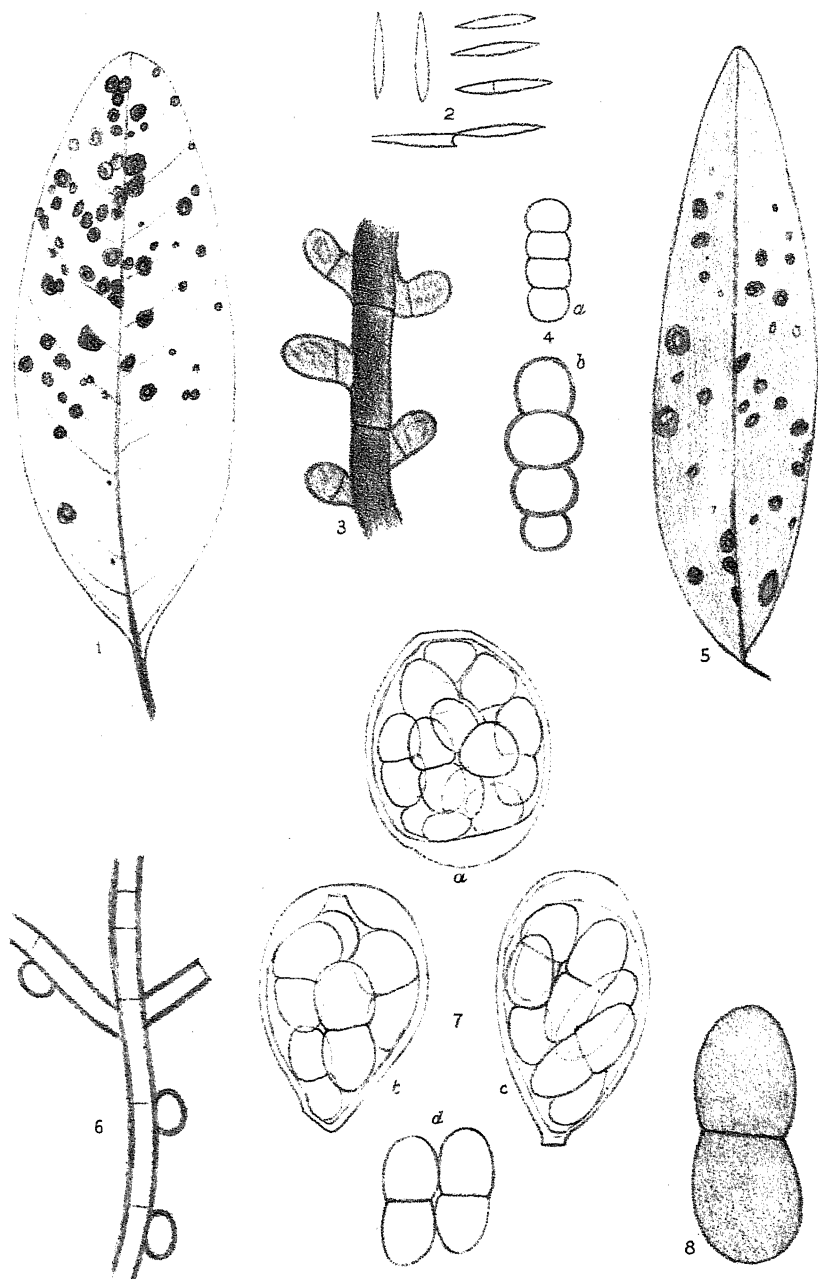
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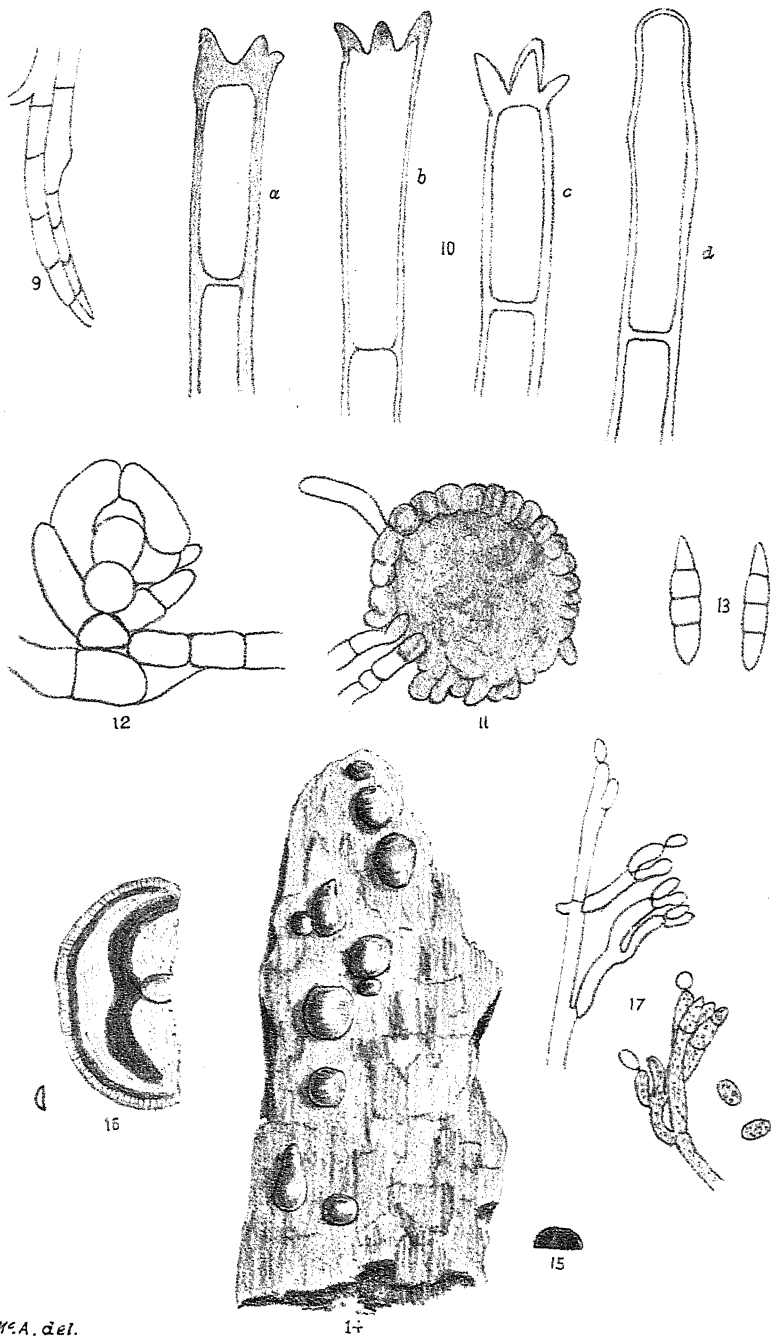
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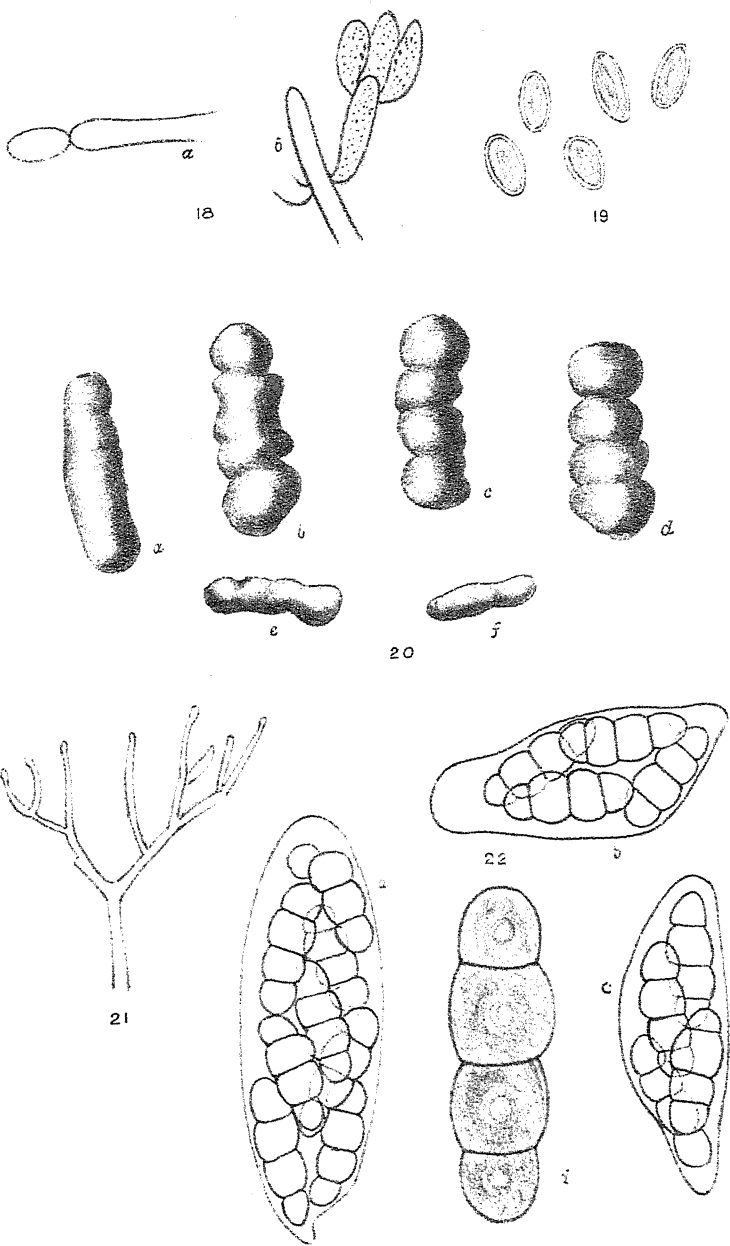
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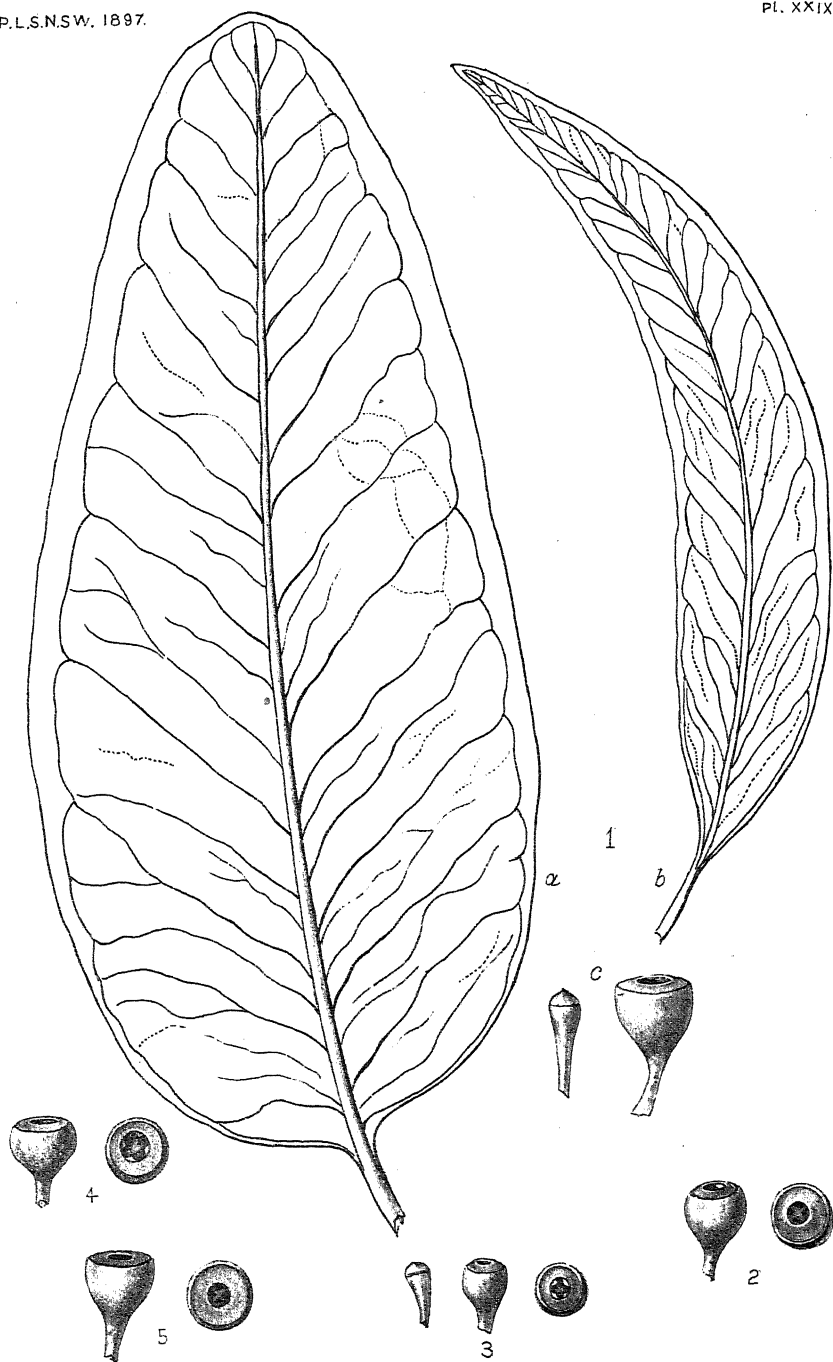




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E. HÆMASTOMA. Sm.

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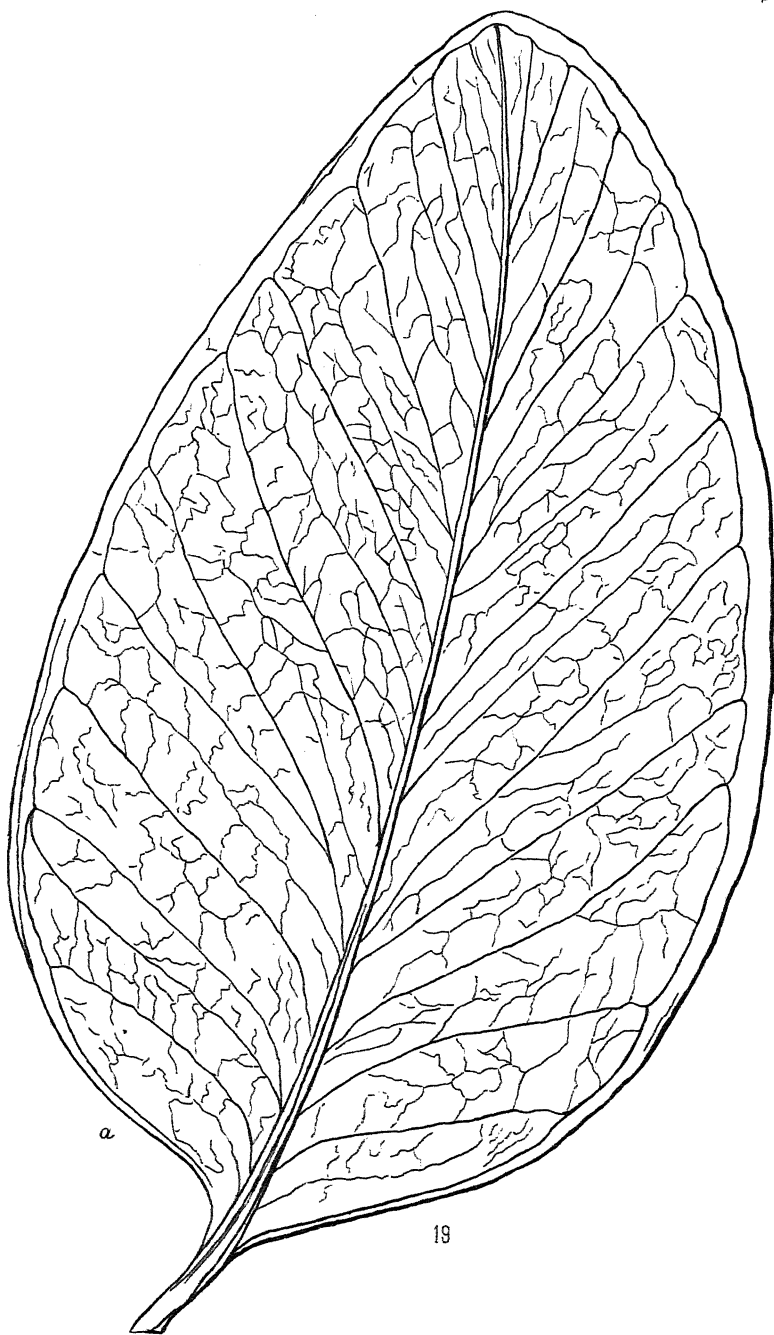


E. H. EMASTOMA (MICRANTHA).

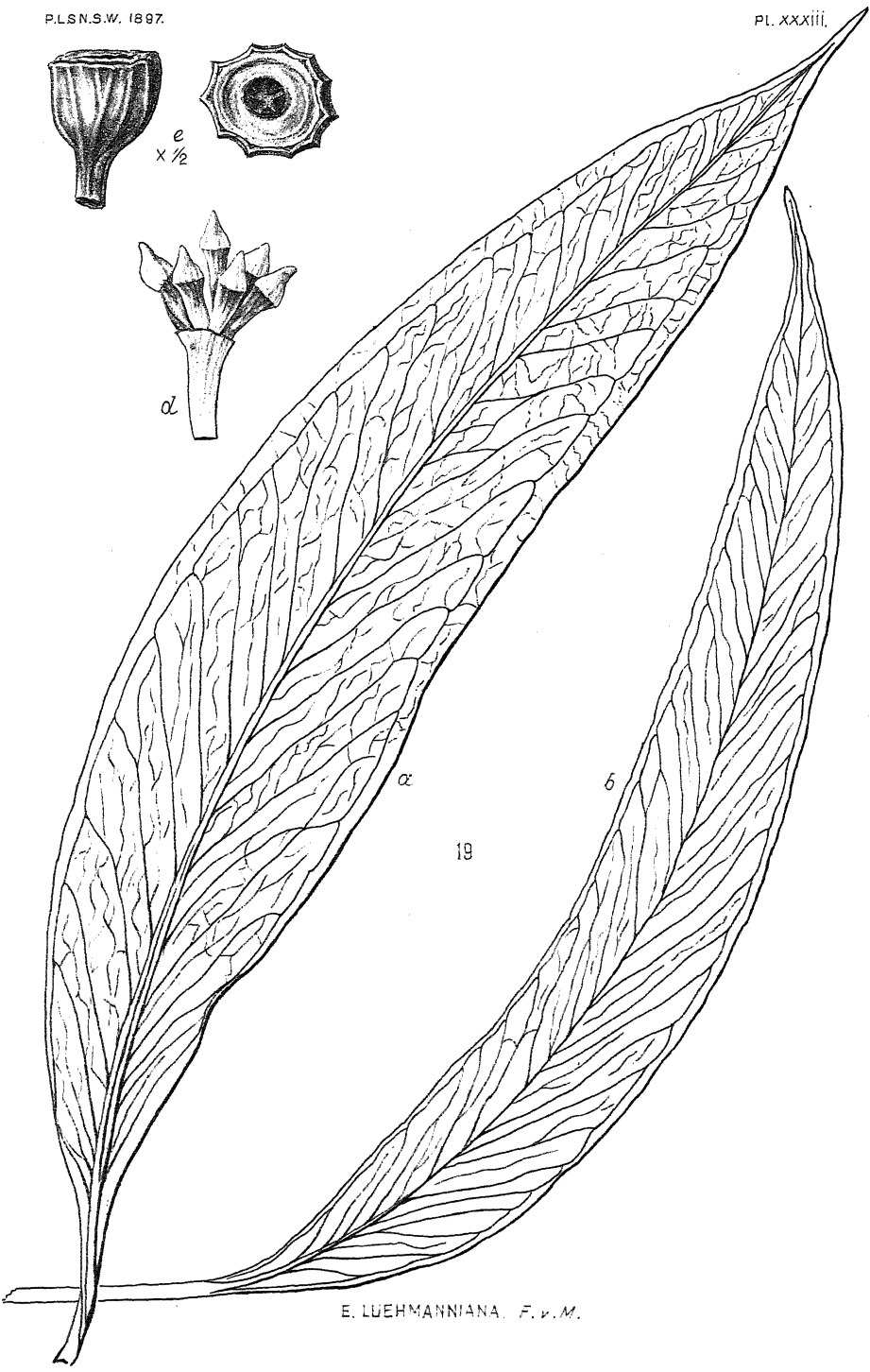
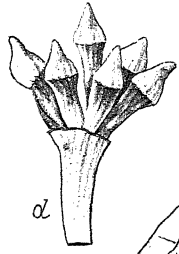
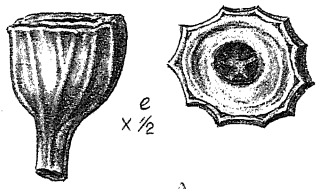


HÆMASTOMA (MICRANTHA) Figs. 8-14.

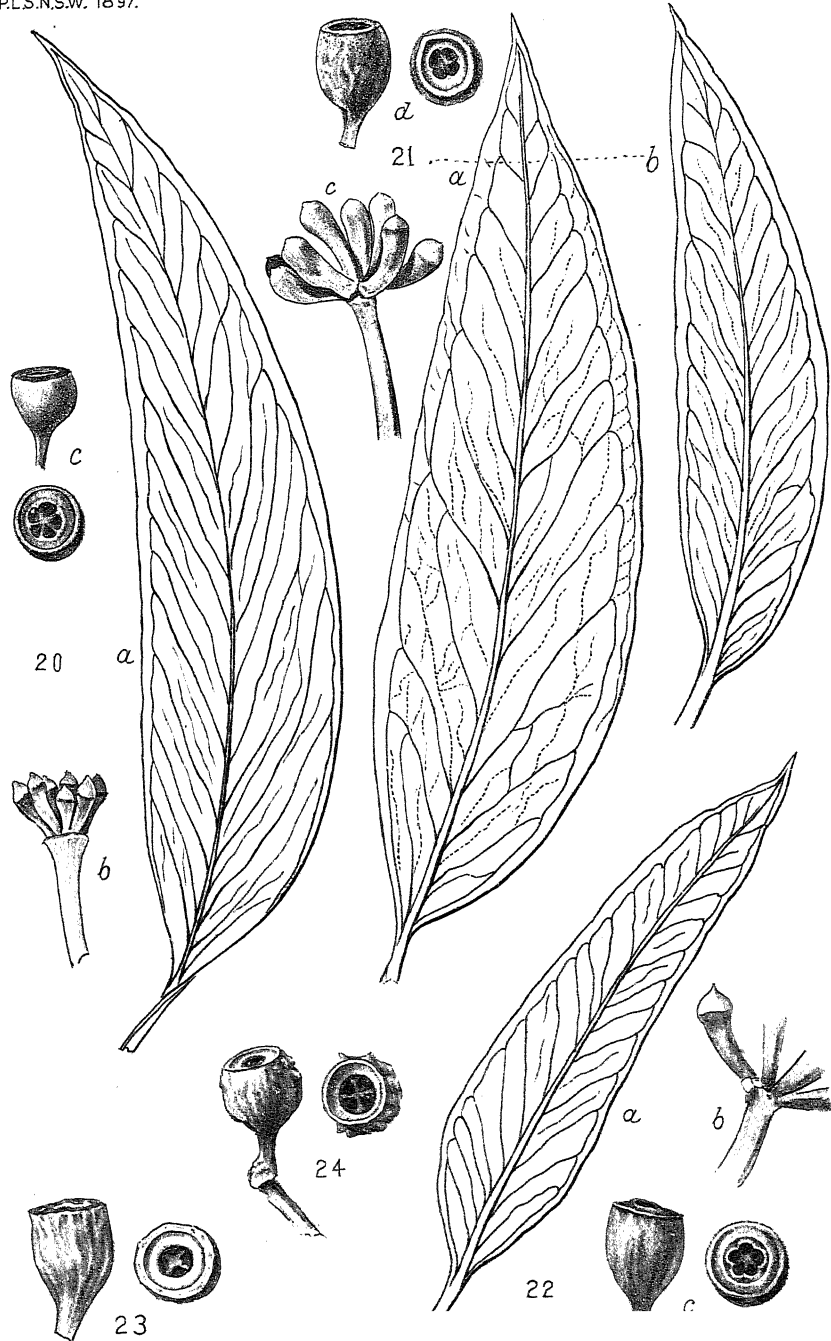
E. STRICTA Figs. 15-17.



E. LUEHMANNIANA, F.V.M.

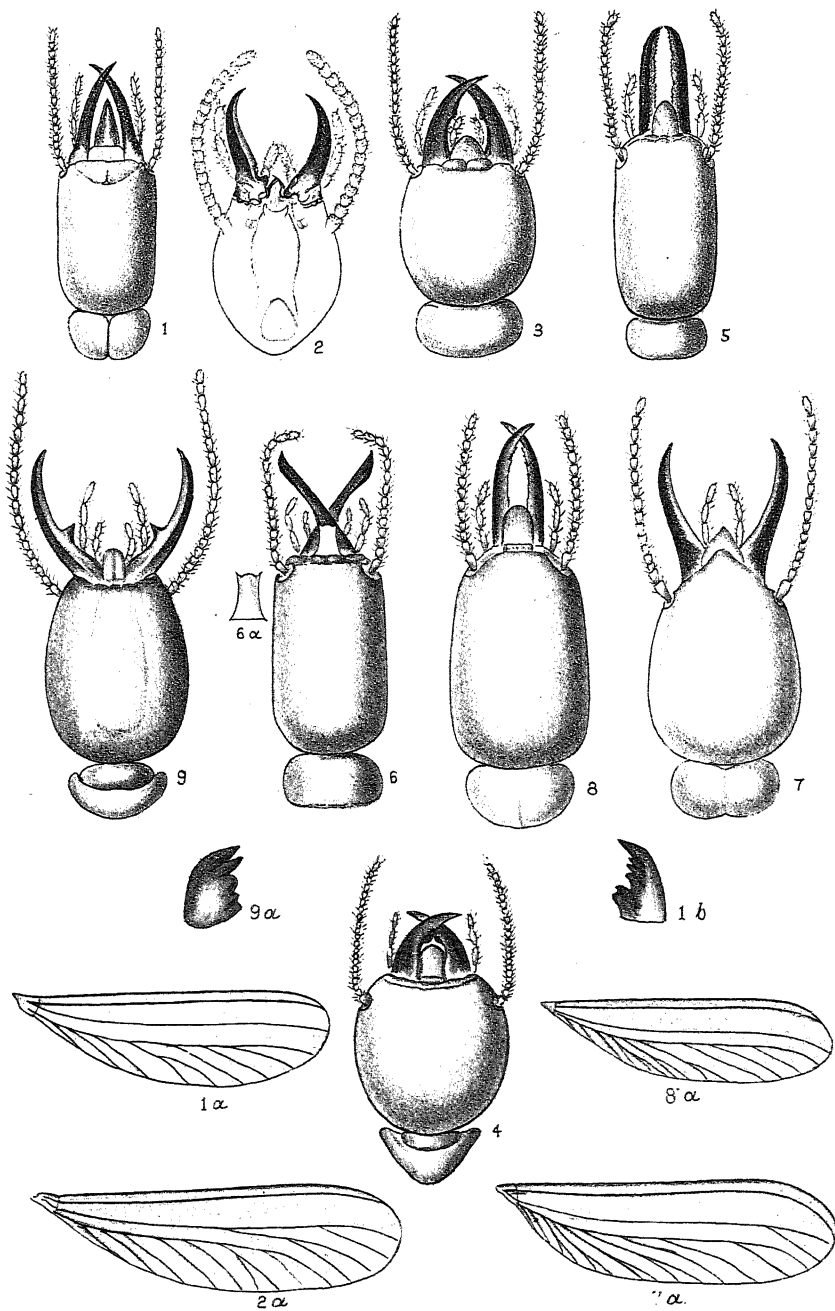


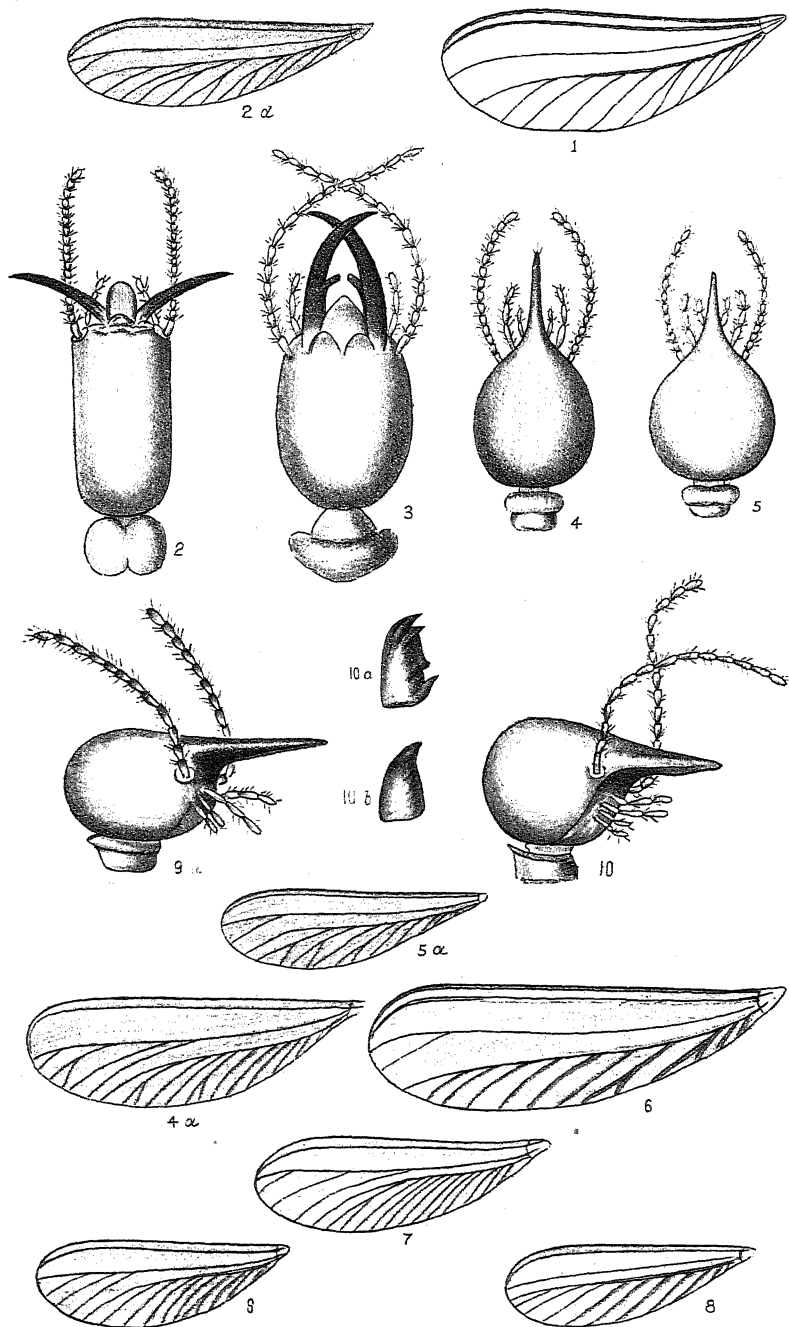
E. LUEHMANNIANA. F. v. M.

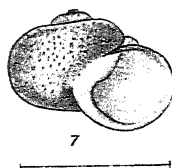
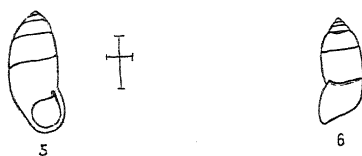
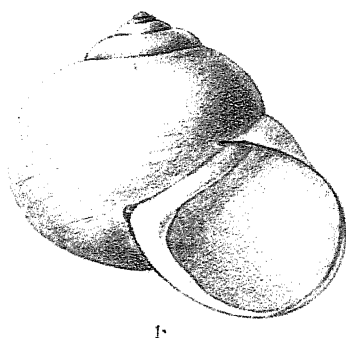
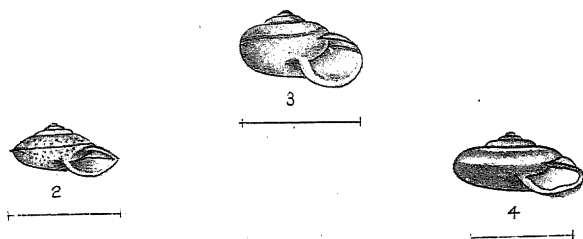


E. LUEHMANNIANA, VAR. *altior*. Fig. 20.

E. OBTUSIFLORA. Figs. 21-24.









Photo, by the Author

FIG. 1.—LAKE ALBINA (Mt. Kosciusko in the distance, to the left). THE PENINSULA IS THAT MARKED BY Mr. R. HELMS AS SHOWING "GLACIAL TRACES."



Photo, by the Author

FIG. 2.—THE WILKINSON VALLEY, FROM MT. KOSCIUSKO, MT. TOWNSEND OR MUELLER'S PEAK IN THE DISTANCE TO THE RIGHT. (Smoke on the left from burning grass.)



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FIG. 1.—THE GARRARD TARN, SHOWING THE ORIGIN OF A CIRQUE OR CORRIE.

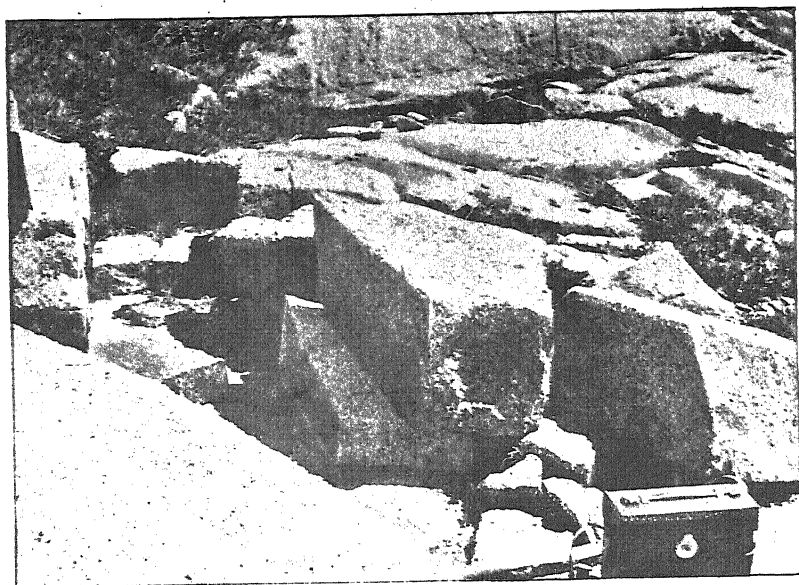
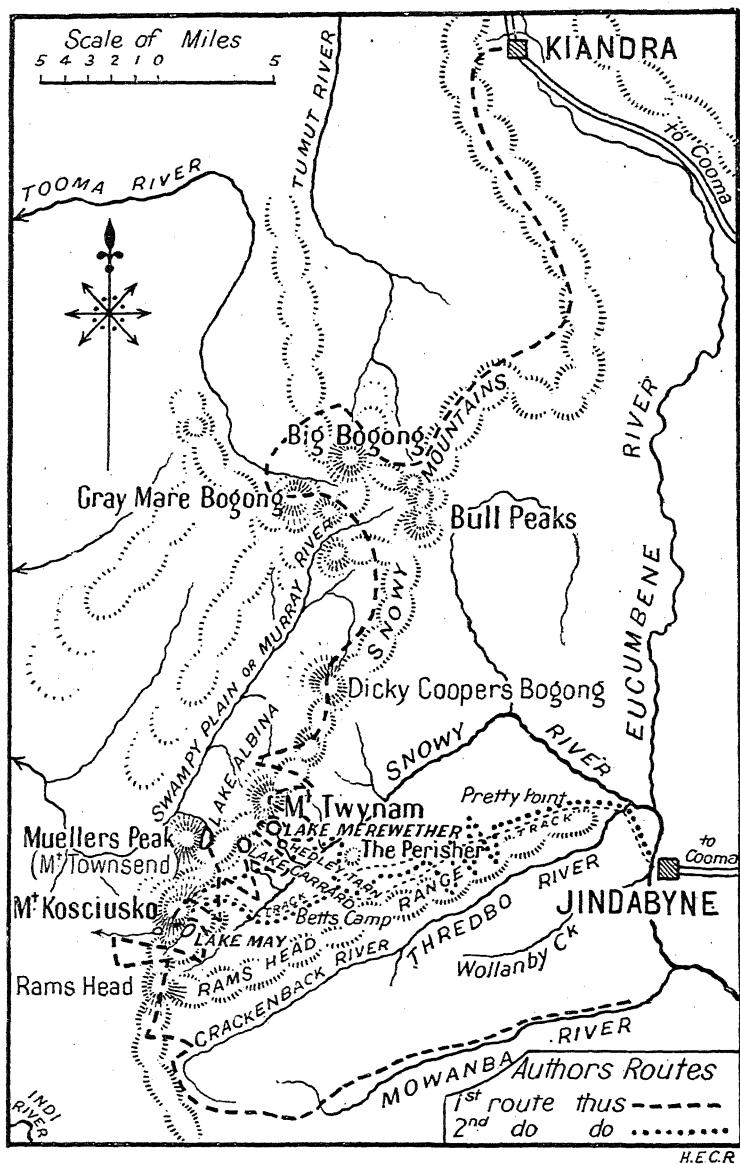


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FIG. 2.—WEATHERING OF GRANITE INTO ANGULAR BLOCKS, NORTH-EAST LAKE MEREWETHER.



THE KOSCIUSKO PLATEAU.

SHOWING THE AUTHOR'S ROUTE AND ALL THE KNOWN LAKES OR TARNs.

I. A. R. I. 75.

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